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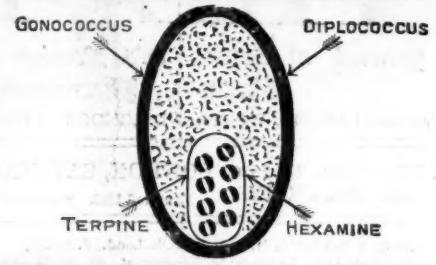


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## LECTURE II.*

### JAUNDICE.

MR. PRESIDENT, FELLOWS OF THE COLLEGE, AND GENTLEMEN,—Several interesting clinical types of jaundice were seen, although these maladies never assumed in France and Flanders the proportions attained in the other seats of war, and no very large numbers of cases of jaundice of any type were seen at any period of the campaign. The most common type of jaundice seen was that usually diagnosed as so-called catarrhal jaundice, an ill-defined clinical group presenting considerable variations in its clinical symptoms; but, of course, a considerable number of cases of jaundice occurred as a complication of the more serious forms of the septic infection of wounds. In addition to these varieties, however, certain other distinct types were seen, one in association with infections of the enteric group, a second apparently connected with influenza, and a third the interesting form dependent upon spirochætal infection and now known as spirochætal jaundice. This malady is regarded by some as identical with the disease formerly described as Weil's disease, although probably not entitled to this name; by others the two affections are thought to be distinct and separate, as the clinical phenomena of the reported cases of the two maladies present some differences. Jaundice was seen as an occasional complication of other infections. Thus a very severe type was seen as a rare complication of pneumonia; but I wish more particularly to discuss the other varieties mentioned above. In addition to the forms of jaundice arising as the result of disease or as the sequel to wounds, a certain number of cases of toxic jaundice of a very severe type and very frequently fatal occurred as a complication in the treatment of syphilis with arsenical compounds.

*Jaundice the Sequel of Wound Infection.*

Two principal varieties of this form of jaundice were seen: firstly, the well-known jaundice accompanying severe streptococcal infections; and, secondly, that associated with infections dependent upon anaerobic bacilli. It cannot, however, be asserted that in the latter instances such anaerobic bacilli were the only organisms present. It would be more correct to speak of the streptococcal cases as free from the presence of gas-forming bacilli and the anaerobic cases as examples of mixed infection in which, however, the anaerobes were the important element.

*Jaundice associated with streptococcal infections.*—The jaundice associated with streptococcal infections was of very varying degrees of intensity—sometimes a mere icteric tinge, in others a jaundice of a very marked and bright yellow colour. Such cases, even when very severe and ultimately fatal, often ran a rather prolonged course, and, so far as my experience went, were not characterised either by the invariable association of severe nephritis or of marked hæmorrhagic complications with the jaundice. In these respects they presented a marked contrast to the cases of jaundice dependent upon anaerobic infections. These streptococcal cases then only showed the clinical picture of jaundice of varying degrees of intensity, although the mere presence of this complication greatly increased the gravity of the outlook.

*Anaerobic jaundice.*—The cases of anaerobic jaundice were much more remarkable in several respects and often presented problems of considerable difficulty from the clinical point of view. The onset and development of the jaundice in these cases were often extremely rapid and the depth of colour most remarkable; generally it was an extremely deep yellow, but sometimes it was definitely a deep orange greatly resembling that seen in spirochætal jaundice.

Some of the most marked examples of anaerobic jaundice were seen in cases where the anaerobic infection was not an immediate complication of the wound, but where it ensued after a latent period of varying length. Thus it might perhaps be best studied in cases of hæmothorax with anaerobic infection, but where this anaerobic infection either only developed some few days after the infliction of the wound, or, at any rate, where it only developed to a serious degree after such a period of latency. One of the most striking clinical features of this variety of jaundice is the extremely rapid development of the jaundice once it is present; thus one day the patient may present only a doubtful icteric tinge of the conjunctiva, but in some 24 hours the skin has become deep yellow or even orange in colour. Secondly, a considerable amount of nephritis is generally, if not invariably, associated with the icterus, and the urine contains not only much albumin but also casts, granular and hyaline. Thirdly, a purpuric condition develops early and more especially epistaxis and hæmatemesis. In the less severe cases the hæmatemesis is probably only dependent upon the vomiting of blood derived from epistaxis, but in the more severe cases true hæmatemesis may occur.

Although this variety of jaundice is always very formidable and often fatal, this is not so always if its true nature is at once recognised and prompt measures are taken to deal with the infection. In cases of gunshot wounds of the chest with hæmothorax the true nature of these cases is very apt to be overlooked. It is not always realised that the development of jaundice of this type is really proof that the hæmothorax is not a simple but an infected one, and that the infection is one due to anaerobes and calling for instant treatment. Such cases are apt to be misunderstood and the jaundice attributed to a supposed wound of the liver, the hæmothorax being regarded as merely part of a more serious lesion, whereas in reality it is the sole lesion. Such mistakes are especially prone to be made when the wound is in the lower chest and on the right side, but so many chest cases are seen where there is only an entry wound and the course and even the position of the foreign body are unknown that this error is by no means limited to cases where the wound of entry is in the hepatic region. It is very doubtful whether wounds of the liver ever cause jaundice unless the wound is infected, but there is no manner of doubt that chest wounds on the right side, where the liver can be shown on post-mortem examination to have been uninjured, may be complicated by the most intense jaundice if the hæmothorax present is infected with anaerobes and gas-forming organisms. This anaerobic jaundice presents considerable resemblances to the jaundice of the more severe forms of so-called Weil's disease, or more correctly of spirochætal jaundice, more especially in the depth of colour of the icterus, the degree of nephritis present, and the tendency to purpuric hæmorrhage; but so far as my experience went the conjunctival injection, herpes, and a certain peculiar muscular tenderness, all very characteristic features of spirochætal jaundice, are not found in anaerobic jaundice.

*Jaundice as a Complication of Definite Infections.*

Jaundice as a complication of certain definite and well-known infections was occasionally seen, but although this clinical variety occurred in such diseases as pneumonia, enteric fever, and in influenza, it was not a common complication, and in the cases of enteric fever, and especially in influenza, the diagnosis was often by no means certain.

Jaundice certainly occurred as a complication of pneumonia even when the causative organism was shown to be a pneumococcus. Usually it was not of a severe type; such patients might have a citron-coloured sputum and slight icterus, conjunctival and cutaneous. I only saw one case of intensive jaundice complicating pneumonia, and here the organism was a pneumococcus of Type II., and the case was fatal, with massive pneumonia involving the whole of the right lung. A few cases of jaundice of moderate severity were seen that were regarded as being in all probability of influenzal origin. These cases were characterised by the sudden onset of a febrile illness with a temperature of 102° or 103° F., intense headache, and general aching pains in the limbs. The pyrexia lasted only a few days, and its subsidence was often accompanied with much sweating, and was followed by the development of jaundice of moderate severity, the colour of the skin being a bright yellow, lasting some

* Lecture I. appeared in THE LANCET, Sept. 11th, 1920 (p. 535).

two to three weeks. Such cases had no splenic enlargement and no evidence of nephritis beyond in some cases a minute trace of albumin in the urine. They were regarded as possibly influenzal in origin as they showed no evidence of infection with either organisms of the enteric group or with spirochætes. Clinically they resembled cases of so-called catarrhal jaundice except that the symptoms at the onset were more severe and the febrile period more marked and prolonged than is usual with catarrhal jaundice. It is remarkable that such cases were not only seen when there was an undoubted epidemic of influenza prevalent, but also that they occurred at other times when such was not the case. It is, of course, quite possible that this variety of jaundice was in reality due to some other and possibly unknown infection. In the severe and undoubted outbreaks of influenza that occurred in 1918 and 1919 jaundice was not a common complication.

The relation of jaundice to the infection produced by the enteric group raises several difficult clinical problems that are not, perhaps, completely settled. In the first place jaundice was not often seen as a complication of undoubted cases of enteric fever, whether this was due to infection with the typhoid bacillus or with one or other of the paratyphoid organisms; and this is in harmony with the experience of civil practice, where such a complication is also admittedly rare. On the other hand, a certain number of cases of febrile jaundice with splenic enlargement as a leading feature of the illness were seen, and in some of these cases the pyrexia was often prolonged and of a type similar to that seen more especially in paratyphoid infections. Such cases also usually showed evidence of the presence of some nephritis, as the urine contained a small or moderate amount of albumin, always more than a mere trace.

In these cases the jaundice was very marked, sometimes intense and always an early feature of the illness, coming on within the first week of illness and not uncommonly so early as to be the first sign of the presence of illness. In other words, the jaundice was not a complication of an existing illness, but rather an early manifestation of such illness, and sometimes actually an initial manifestation. No fatal case fell under my observation, and thus post-mortem evidence of their nature is lacking; but bacteriological evidence was in some, but not in all, in favour of this variety of jaundice being due to infection with organisms of the paratyphoid group. This evidence was usually only that afforded by an agglutination test, and such evidence is not always really conclusive, as there are numerous possible fallacies and some technical difficulties.

The fact remains that there was a small group of cases of febrile jaundice with definite and sometimes considerable splenic enlargement and moderate albuminuria; that in such cases the jaundice was an early and prominent feature of the illness; and that in some, but not in all, there was some evidence that possibly such cases were due to infection with organisms of the enteric group, limiting their activities to infection of the biliary passages and not producing ordinary enteric fever. It is, however, by no means certain that all cases of this clinical type belonged to this group, and it may well be that there are other infections affecting primarily the biliary passages. Nothing comparable to the serious outbreaks of jaundice reported as due to paratyphoid infection that have been described as occurring in other fields of war—e.g., Gallipoli—occurred in France and Flanders.

### SPIROCHÆTAL JAUNDICE.

Perhaps the most interesting variety of febrile jaundice seen in France was that dependent upon spirochætal infection. There is some confusion in nomenclature with reference to this disease owing to the doubt whether these cases are the same type as the disease formerly described under the name of Weil's disease. There are considerable clinical resemblances between the two maladies, but also some differences, more especially in regard to the condition of the spleen, enlargement being stated to be much more frequent and characteristic of the one than of the other. The malady to which Weil's work directed attention was known as one liable to occur in armies, and hence from the earliest period of the campaign watch was kept for any cases of jaundice of doubtful origin; but the first case I saw of this disease occurred in a Canadian in December, 1915. A moderate number of cases came under observation in 1916, and in the subsequent years, 1917 and 1918, a smaller number was seen. The clinical picture presented by a severe case is so distinct and characteristic that the malady can scarcely be overlooked by anyone familiar with it; but in the slighter forms this is not the case, and it may then not only be readily confounded with some of the more severe forms of so-called catarrhal jaundice, but even with quite mild forms of the latter disease.

#### *Distinctive Features.*

There are many distinctive features in spirochætal jaundice, but they do not demand more than short mention here, as several descriptions of the malady have now appeared in medical literature.

In cases of moderate severity the disease is of sudden onset, with considerable pyrexia, the temperature rising to 102° or 103° F., or more, the fever lasting generally about ten days, sometimes more, and in slight cases sometimes less, and then returning rather suddenly to the normal, but without a distinct crisis. A most characteristic feature of the temperature chart is the occurrence of a secondary rise of temperature or relapse lasting only two to four days, and taking place within a week of the subsidence of the initial pyrexia. This secondary rise is not always present, and may be absent in the cases of the greatest severity that are fatal, as is not infrequently the case in the earlier stages of the illness. It is, however, not uncommon in quite mild cases, and affords one of the means of distinguishing these mild cases of spirochætal jaundice from similar mild cases of so-called catarrhal jaundice. The jaundice is remarkable for its great intensity in the severe cases and for the frequency with which it is of a deep orange colour, a depth and variety of colour that was not familiar to me in civil practice. With the subsidence of the pyrexia the jaundice begins to diminish, and it is of interest that the relapse with the recrudescence of fever is not accompanied with any corresponding increase in the jaundice.

Another extremely characteristic feature of the illness, but perhaps not present in all cases, is not only the occurrence of severe muscular pains during the earlier periods of the pyrexia, but also the presence of very considerable muscular tenderness.

This tenderness of the muscles is especially marked in the muscles of the thighs and of the abdominal walls, but sometimes it is more widespread and may affect also the arms. The pain in, and especially the tenderness of, the abdominal recti and of the thigh muscles was not uncommonly so great as to require cradles to keep off the pressure of the bedclothes. This muscular tenderness was not limited to the severe and fatal cases; it may be quite marked in cases of very moderate severity, and again affords a useful diagnostic criterion. I know of no other variety of jaundice where such a phenomenon as this is present. Although no gross changes are obvious clinically to account for the extreme muscular tenderness, examination of the muscles from a fatal case, in the first instance by Captain Pringle, R.A.M.C., and subsequently in several other fatal cases by Captain E. F. Bashford, R.A.M.C., revealed the presence of very distinct lesions both degenerative of the muscle fibres and interstitial, the latter of an inflammatory nature with hæmorrhages. The details of this muscular lesion will, it is hoped, be published later. This muscular lesion, both clinically and pathologically, is a very characteristic feature of the malady, and is certainly usually, if not invariably, present. It is a useful clinical sign both in severe and in mild cases. In the former it may assist in differentiating between jaundice dependent upon spirochætal infection and that seen after salvarsan and similar compounds. In mild cases it may assist in differentiating between spirochætal and catarrhal jaundice. Similar muscular lesions are present in the guinea-pig after inoculation with the blood derived from human cases during the early pyrexial period. It is curious that the symptoms caused by the muscular lesions in spirochætal jaundice should be so severe, since the much more obvious muscular lesions occurring occasionally in other infections—e.g., influenza, enteric fever—are often not associated with very marked clinical symptoms.

Purpura in some form is another characteristic feature of the spirochætal jaundice; the purpuric eruption on the skin is often scanty and the spots small, but other purpuric phenomena are common.

Thus an outbreak of labial herpes rapidly becoming hæmorrhagic is of very frequent occurrence and bleeding from the gums is common, leading to the presence of masses of decomposing blood clot encrusting the teeth. Epistaxis is also very common and severe hæmatemesis is often the immediate cause of death. Hæmatemesis may be scanty and repeated, but several instances were seen where the first hæmatemesis was of large amount and either rapidly or even immediately fatal. In a few instances such fatal hæmorrhage occurred in cases where up to the time of its occurrence there had been no symptoms that seemed to warrant such a grave prognosis.

Nephritis is a very constant accompaniment of spirochætal jaundice, and the amount of albumin present is usually considerable and may be large.

In the mild cases the albuminuria is often transitory in duration, lasting only a very few days, whereas the jaundice, even in the mild cases, may last three to four weeks. The nephritis is not accompanied by dropsy so far as my experience went, even when it was of a very severe type, but the urine may become very scanty or the secretion even may be suppressed. In the cases where purpura is marked profuse hæmaturia may be present similar to that seen in the most severe forms of purpura hæmorrhagica, and such cases may also suffer from hæmorrhage from the bowel and from hæmoptysis. It is difficult to say to what extent the severe and fatal cases suffer from uræmia, but such patients become very prostrate, lethargic, and apathetic, and may be partially or even completely unconscious, with a subnormal temperature for several days before death. It is difficult if not impossible to say how far these symptoms are uræmic and how far they are cholæmic in origin.

Another remarkable feature of the disease is the frequency of pulmonary lesions and of pulmonary complications, more especially areas of lobular pneumonia with the expectoration of a sanguinolent sputum.

On post-mortem examination areas, often of some size, of imperfect consolidation, together with extreme congestion and hæmorrhagic infiltration, are found and are very characteristic features of the morbid anatomy of the disease. Herpes (labial) and purpura are not the only rashes seen. Sometimes there is a most remarkable roseolous rash, each spot being one-third of an inch in diameter and of an intense bright red colour and distributed all over the trunk and limbs. The appearance of the patient is most striking owing to the contrast of the bright red rash on the background of deep orange jaundice. Such rashes have not apparently any grave prognostic significance.

The conjunctival congestion that is seen in the earlier stages of the disease is also a very characteristic clinical sign.

The clinical features of a severe and especially of a fatal case of spirochætal jaundice are then very marked and characteristic. A febrile onset with marked muscular pains and local muscular tenderness, intense jaundice often orange in hue, herpes labialis, and especially hæmorrhagic herpes affecting the lips and face, purpura, possibly markedly hæmorrhagic in character, nephritis and great prostration, together with much vomiting—all these form a very definite and characteristic clinical picture not presenting any very close resemblance to other diseases met with in temperate climes.

*Diagnosis.*

The diagnosis of well-marked cases is therefore not usually difficult, although sometimes it may not be easy to exclude at once the possibility of the presence of one of the more severe forms of toxic jaundice such as that due to salvarsan, or that due to phosphorus, and I have seen one case of spirochætal jaundice where the extreme congestion and hæmorrhagic condition of the mucous membrane of the stomach was quite comparable to that seen in phosphorus poisoning. It is sometimes possible to detect the spirochæte in human cases by direct examination of the blood, but a much more reliable method is to inoculate a guinea-pig with a small quantity of blood from the suspected case during the febrile period of the illness and before the eighth day of the disease. The spirochæte can be found with far greater ease in the experimental animal after the reproduction in it of the disease. Further, the spirochæte can be recovered from the urine in the human subject during a prolonged period in marked contrast to what obtains in the blood, as there it can only be found in the earlier days of the disease. The detection and recovery of the spirochæte from the urine present, however, certain technical difficulties that need not be considered here as they are dealt with in the papers by several authors describing this disease and its diagnosis. Whilst there is no great difficulty in recognising the more severe forms of the disease, there can be but little doubt that a certain, and perhaps a considerable, number of cases are looked upon as merely cases of so-called catarrhal jaundice.

In these milder cases the febrile onset is of less severity and the fever persists for a few days only, so that not infrequently the jaundice is not noticed until the pyrexia has disappeared. In this respect these cases resemble not only cases of catarrhal jaundice, but also cases of post-influenzal jaundice, and the resemblance to this latter disease may be still greater owing to the presence of limb pains in both of them. The jaundice in the mild cases may only be of moderate intensity, although even in these it is usually more marked than in the average case of catarrhal jaundice. The nephritis also may be slight and transitory, so that clinically it may be impossible to distinguish these mild cases from catarrhal jaundice unless the observer is fortunate enough to see the case in the first week of illness or whilst pyrexia is still present. Then by inoculating a guinea-pig with blood from the patient the spirochæte can be recovered, even in cases of very slight severity, and their true nature established.

There are two clinical points that may be of assistance in the diagnosis of even these mild cases, and are sometimes sufficient to separate these cases from catarrhal jaundice—i.e., the presence of the muscular tenderness and the occurrence of the febrile relapse. Both these phenomena may occur in quite slight cases of spirochætal jaundice. The difficulty in the diagnosis of these slight cases must necessarily be considerable, because the organism can only be recovered from the blood in the early stages, and as at this stage jaundice may be absent the full examination of the blood is not made, as the malady is not suspected. Hence the pyrexia, particularly as it is transitory, is attributed to some such cause as supposed influenza, and then when the jaundice supervenes it may be too late to detect the spirochæte in the blood.

How many cases of supposed catarrhal jaundice or of post-influenzal jaundice are really of spirochætal origin I am unable to say, but I am inclined to think that in all probability it is appreciable, as we recovered the spirochæte from the blood in several cases indistinguishable from catarrhal jaundice in the trivial character of the illness, but here we were fortunate in seeing the patient early in the illness. Nevertheless, in many cases we failed. Doubtless catarrhal jaundice is not a definite clinical entity; rather it includes probably a number of conditions of different nature and of different origin—some of cholangitis, some of duodenitis, possibly some of pancreatitis, although perhaps cholangitis of some kind is answerable for the majority of cases. Further, it would seem that at present we do not know the real causation of the bulk of cases of catarrhal jaundice. From its clinical course it would seem to be an infection, but no causative organism has as yet been found, and no spirochæte has been found in the great majority of cases examined. Further, although there is a general resemblance in the clinical picture of all cases of catarrhal jaundice, yet there are individual differences that are very difficult to understand. Are these dependent upon a mere variation in the intensity of the lesion, or are they due to quite different and separate varieties due to different causes? Thus all observers would agree that some cases, indistinguishable at the outset from ordinary mild catarrhal jaundice, after a few days' illness suddenly run a totally different and rapidly fatal course, with the sudden rapid development of dangerous symptoms such as hæmatemesis or cholæmia. The observations made in France showed that such cases might be spirochætal in nature and, further, that all mild cases of spirochætal origin did not necessarily follow such a course.

Thus, in so far as spirochætal jaundice is concerned, it it would seem that profound differences in clinical type were still consonant with one and the same cause, and did not necessarily indicate different ætiology. There are, however, differences seen in any large series of cases of catarrhal jaundice that are difficult of explanation as merely the result of differences in the severity of the infection. To mention only two, the incidence of nephritis in catarrhal jaundice and the presence or absence of splenic enlargement. So far as my experience goes in the observation of considerable numbers of cases of catarrhal jaundice, the severity of the illness and the degree of jaundice can certainly not be correlated with the degree of albuminuria present or with the presence of splenic enlargement. Some cases of so-called catarrhal jaundice have marked enlargement of the spleen and some had considerable albuminuria; others did not, and this could not be correlated either with the severity of the illness or with the presence of some definite infection such as a spirochæte or organisms of the enteric group. The fact that some cases of mild simple catarrhal jaundice yielded under favourable conditions evidence of the presence in the blood of a spirochæte suggests that this group of cases is not a single clinical entity and that probably many owe their origin to some unknown specific agent.

NEPHRITIS.

The study of this disease during the war has yielded some facts of interest both from the point of view of ætiology and of clinical medicine, and it affords a striking example, showing how the clinical phenomena

of a thoroughly well-known malady may apparently be different to those usually described when the disease is seen on a large scale and under conditions different to those we were accustomed to. All physicians very soon realised that the clinical phenomena of nephritis as seen in France were somewhat different to those familiar to them in civil practice. Some attributed this to the supposed occurrence of a new disease and so labelled it "trench nephritis," now modified to "war nephritis." Others were not so confident that the differences, such as they were, might not be more correctly attributed to the different conditions under which the disease occurred.

In my first lecture I drew attention, in discussing acute rheumatism, to the efficiency with which the medical examination of the troops had been carried out in this country prior to their departure overseas and to the rarity with which organic diseases such as valvular disease of the heart were met with. The same is true of other chronic or latent diseases, and the rarity of chronic renal disease in the original Expeditionary Force and in the subsequent armies sent over to France was very striking.

*The Small Contracted White Kidney.*

Thus cases of such an insidious malady as chronic nephritis in its various forms were quite infrequent, although a few examples of that remarkable condition, the small contracted white kidney of young adults, were seen.

It is a very extraordinary fact that men suffering from such a lesion as this should have been able to withstand even for a time the hardships, fatigue, and rigours of the campaign. Several instances of this disease were met with, precisely similar in their clinical course to those seen in civil life, in that the patient only reported sick with the onset of the terminal uræmic manifestations. In one such case the man had gone through all the hardships and fatigue of the earliest stage of the campaign and had fought through the first battle of Ypres, yet he suffered from the typical form of the disease, dying from acute fulminating uræmia, and the kidneys together weighed little over three ounces.

Several similar instances of this condition were seen throughout the campaign, and in all cases death resulted from acute uræmia.

*The Occurrence of Nephritis in the Spring of 1915.*

These cases of chronic renal disease, although of interest, were so few in number that they were of little importance and no appreciable number of cases of nephritis occurred until the spring of 1915. This is the first fact of interest with reference to this disease because the autumn of 1914 was cold and very wet and the troops suffered greatly from hardships of various kinds, associated with the heavy fighting of the period and the great exposure of the men in the earliest days of trench warfare. They also suffered much from fatigue owing to their long periods of stay in the trenches and the paucity of reliefs. Nevertheless, nephritis practically did not exist. In March and April, with the advent of spring, cases of nephritis suddenly became more common, and in a short time it became obvious that the cases were occurring in considerable numbers, although at no time were the numbers such as to cause anxiety from a military point of view. It may be of interest to recall that about this time what was subsequently known as trench fever first began to attract attention. The first cases of nephritis that came under my observation occurred in March, 1915, and the first cases of pyrexia of an unknown type, subsequently recognised as trench fever, in May, 1915. Trench fever is a disease that might be readily overlooked or confounded with other maladies, but this is not so with nephritis, and there can be little doubt that the malady was not prevalent until the spring of 1915.

The disease affected all branches of the Service, men in the fighting line belonging to all arms, men on the lines of communication, and, what is especially important to note, men such as hospital orderlies who had never left their base hospital. Thus, one hospital unit in Boulogne had four cases at one and the same time amongst their orderlies, men who on leaving England had been nowhere in France except their hospital, a building in the town of Boulogne. Emphasis is laid on these facts because it was only in the early years of the war that such facts could be elicited; later on men were moved about to such an extent that no such observation as the above was possible. Whilst men belonging to all branches of the Service were affected, the number of officers affected was extraordinarily small, and this was true for the whole campaign. A few cases occurred in women, more especially in nurses.

*Immunity of Indians.*

The most remarkable fact, however, is that the disease did not occur in the Indian native troops. The large Indian native hospitals, with a total of several thousand beds, were in the area of my work and I paid them constant visits. I saw no case of nephritis and I was informed that only three cases of nephritis had been returned from the whole Indian contingent, and this included one of obvious chronic disease in a native officer some 42 years of age. Thus, at a time when the disease was increasingly prevalent in the British troops it did not occur in the Indian troops.

Although the Indians did not suffer from nephritis, nevertheless they suffered greviously from other diseases attributable to exposure. Bronchitis and pneumonia of various types were extremely common and also of considerable severity, and large wards were entirely filled with such cases. This immunity of Indian troops to nephritis is a striking example of the complexity of the problem of the causation of this disease. Approximately 10 per cent. of the cases of nephritis yielded a history of some antecedent illness, such as a severe cold, diarrhœa, influenza, or sore throat, and doubtless the percentage was really higher as such antecedent illness is often slight and overlooked by the patient. On the other hand, a considerable number of patients, 30 per cent. in a series of 278 cases, either gave a history or had distinct signs of bronchitis when admitted to hospital. Were it not for the fact that the Indians suffered from bronchitis to a very serious degree, but did not develop nephritis, it might be concluded that the frequency of such respiratory affections was an ætiological factor of some importance in the production of the disease.

It is important to realise that the respiratory affection was present in cases of primary nephritis—that is to say, in patients admitted to hospital on account of the renal lesion, and not on account of the bronchitis. Stress is laid on this point, because during the winter of 1916-1917 the nephritis statistics of the army were swollen by the inclusion of large numbers of cases of secondary nephritis, where the renal lesion was merely a complication of severe bronchitis and of lobular or broncho-pneumonia—both of these diseases were prevalent and very severe at that time. Although nephritis was present in these patients and was a common lesion in the fatal cases, such cases do not belong to the same group as those of primary nephritis, and the clinical effects are quite different. Thus this secondary nephritis is mainly characterised by the excretion of scanty urine, with a variable but usually small quantity of albumin. The inclusion of these cases of secondary nephritis also vitiated the mortality statistics, inasmuch as these patients had a high mortality dependent upon the severe character of the primary respiratory disease. In the cases of true or primary nephritis a history could be obtained in some 10 per cent. of the patients of their having suffered at some previous time from a similar attack or that they had been under treatment for "inflammation of the kidneys" or for "Bright's disease."

It is probable, therefore, that in at least 10 per cent. of the cases the patients had suffered from a previous attack of nephritis; this result was obtained from personal investigation of a series of 571 cases. It is difficult to determine what proportion of the patients apparently suffering from primary acute nephritis were in reality suffering from an acute exacerbation of a chronic lesion. That this was so in a certain proportion of cases is evident from the post-mortem findings, as it was not uncommon to find distinct and unequivocal evidence of old-standing lesions in cases where on clinical grounds the malady had been regarded as acute. In a series of 149 cases personally examined a markedly raised blood pressure and apparent hardening of the radial artery were present in 27 per cent.; but it is quite certain that these phenomena were not in all cases evidence of the existence of chronic disease, as such changes may occur quite rapidly as the result of primary acute nephritis. It is, at any rate, certain that the bulk of the cases of true nephritis occurred in men that had not suffered from previous renal disease, and, further, that the nephritis was not constantly the sequel of any severe immediately antecedent illness. On the other hand, a considerable proportion of the cases yielded evidence of having suffered from a trivial illness or presented slight signs of such illness, more especially in, but not limited to, the respiratory tract.

*The Influence of Age on Ætiology.*

The study of nephritis in the army afforded an opportunity of determining the influence of age in the ætiology of the disease, and 2297 cases were analysed

from this point of view in 1915–1916. These were all cases of primary nephritis, 50·2 per cent. of the cases occurred in men under 30 years, 72·7 per cent. in men under 35 years of age, 15·5 per cent. in men between 35 and 40 years, and 11·8 per cent. in men over 40 years of age. It is therefore clear that the disease is by no means limited in its incidence to the older men, as more than 25 per cent. of the cases occurred in men under 25 years and nearly 75 per cent. in men under 35 years of age.

Colonel Hume has published some statistics of the ages of a body of 3000 hospital patients, from which it would appear that 78 per cent. of these men were under 35 years of age, figures closely resembling the above nephritis results.

*Features of Clinical Interest.*

Clinically the cases presented many features of interest, and their study may perhaps lead to the modification of some of our conceptions of this disease, and more especially perhaps our views as to the gravity of nephritis. The onset of the disease might be either gradual or apparently sudden, and when sudden the earliest symptoms might be dyspnœa, either nocturnal or produced by exertion—e.g., on the march, dropsy, or pyrexia with hæmaturia. Some of the cases of sudden onset with dropsy also had slight pyrexia, but in all febrile cases the fever was slight and of short duration.

There is a remarkable group of cases to which I alluded in a first paper in the *Quarterly Journal of Medicine*, vol. ix., January, 1916, characterised by rather profuse hæmaturia and pyrexia with no dropsy. The curious feature of these cases first seen in the spring of 1915, and then later throughout the campaign, was the fact that after the subsidence of the initial pyrexia recurrences of pyrexia consisting of a single spike on the chart, and lasting only a few hours and accompanied with hæmaturia, would take place. The temporary character of the fever and the sudden hæmaturia were very similar to that seen in cases of renal embolism. The charts presented considerable resemblance to those subsequently described in one form of trench fever, but there does not seem to be any sufficient ground for regarding these cases of nephritis as really associated with trench fever. . These cases of hæmorrhagic nephritis were on the whole uncommon, and formed only a small proportion of the total cases. It was exceptional for dropsy to occur, and the prognosis was good as they generally cleared up in a short time. In the more common variety of the disease pyrexia was either absent or was only present to a slight degree in the earliest stages of the malady. Clinically dyspnœa was a leading feature of the illness and dropsy of the usual renal type was common. A most striking feature of the majority of the dropsical cases was the rapidity with which it subsided, although in any large series of cases some were seen of the type so familiar in civil hospitals where the dropsy was refractory to treatment and persisted. This rapid subsidence of considerable anasarca was certainly a novel experience to most observers familiar with renal dropsy as seen in London hospitals. In many cases where the anasarca was considerable on admission it had disappeared within a fortnight, and in slighter cases its duration was only a few days. Uræmic manifestations in the form of epileptiform fits were not uncommon, and such fits might be repeated and of great severity; nevertheless, they were rarely fatal. Other uræmic phenomena were uncommon. Inflammatory complications were uncommon, and the mortality from the disease, at any rate during its early stages, was very low. In a considerable series of cases personally examined in 1915 it was as low as 0·4 per cent. In a larger series for the year 1916 it was 0·93 per cent., and in 1917, when, as mentioned above, the statistics included cases of secondary nephritis complicating acute respiratory affections, and where death was at any rate partly dependent upon the respiratory disease, the rate was as high as 1·32 per cent.

The clinical study of these cases should make us revise some of our conceptions of renal disease and would seem to suggest that the clinical picture of the malady as we usually see it in civil hospitals is really the picture of certain more severe and unfavourable cases. Cases quite similar to these were seen amongst the large numbers of cases seen in the army, but the broad fact remains that the great majority of cases of acute nephritis, even when dropsy was considerable, or when severe epileptiform fits occurred, not only cleared up, but cleared up very rapidly. The fact seems to be that service in the army compelled a man with nephritis to seek medical advice at an earlier stage than is the case in civil life or when the illness was only slight, and thus we had the opportunity of obtaining a more correct impression of the features of the disease, besides that of seeing very large numbers of cases, amounting in some instances to several thousand. It would seem that this is really a more satisfactory explanation of such differences as were found than to assume that the disease was a special and peculiar one to the army.

ACUTE INFECTIVE POLYNEURITIS.

Amongst the rarer forms of disease seen in France there was a group of cases of generalised palsy of a peculiar type but with very constant and uniform features and similar in character to certain cases described by Osler under the term of acute febrile polyneuritis. Isolated cases were seen from time to time during the earlier periods of the war, but a more considerable number was seen in 1917 and a few in 1918.

*Onset.*

Two modes of onset may be recognised. In one there is a definite history of an illness, usually of a slight character, prior to the onset of the palsy; in the other the onset of the palsy is the first manifestation of the disease. It is probable that the first mode of onset should be regarded as the more typical.

Usually the initial illness is of a mild character and moderate pyrexia, headache, vomiting, pain in the back and along the spine, together with some pain in the limbs and possibly in the abdominal wall, are the leading symptoms. The headache may be severe, and in a small proportion of cases the severity of the headache, vomiting, and pain in the back are such as to resemble the early symptoms of cerebro-spinal fever. The pyrexia is of short duration, lasting two to four days and rising usually to 100° to 101° F. Exceptionally a temperature as high as 103° has been observed. All the symptoms subside rapidly and the patient apparently regains his former health, and thus such cases are often regarded as being due to influenza or to pyrexia of uncertain origin. A period of latency now occurs which may last for as long as six weeks from the date of the onset of the initial illness and then the palsy becomes manifest. In other cases this period of latency is much shorter, and this would seem to be more especially the case in those instances where the initial symptoms were so severe as to resemble those of cerebro-spinal fever.

*The Palsy.*

In the less severe cases the onset of the palsy is noticed only as a general weakness that increases more or less rapidly.

In the more severe cases the onset of the palsy is more dramatic; thus a man may suddenly fall down on parade or on the march, and in one case under observation at the time, the patient sat down to his midday meal apparently well and was unable to rise. Even when the onset is as sudden and marked as this there is not complete paraplegia and the patient can often stand and sometimes even walk with assistance.

Numbness and tingling in the extremities may precede or accompany the onset of palsy, and pain in the back, limbs, and body may also occur at this time. Usually the palsy affects at first the legs and may be confined to them. The legs are affected as a whole, and no case has been seen where the palsy was limited to the distal segments of the limb nor where it was limited to one limb. In some cases where the patient only complains of weakness of the legs, examination reveals that the arms are also affected, but in many cases there is a distinct interval between the date of the onset of the leg palsy and that of involvement of the arms, and this interval may be as much as three days. A marked feature of the palsy is the greater involvement of the proximal portion of the limbs, so that the movements of the shoulder and hip muscles may be extremely weak at a time when the patient can move the fingers or toes freely. Similarly, the trunk movements are frequently affected, so that the patient is unable to raise himself in bed, sit up, and may be unable to turn in bed or even to raise his head from the pillow. When the trunk muscles are involved the patient's condition is necessarily very serious, and death may occur as a result of involvement of the muscles of respiration. Nevertheless, some cases recovered even when the helpless state produced by the palsy of the trunk muscles persisted for several weeks. Cases in which the palsy is widespread, involving trunk and limbs, but not severe in amount, are very apt to be overlooked and classed as functional or neurasthenic, or even suspected of malingering. Such cases may, however, really be very serious and even fatal, as not infrequently such palsy may increase rapidly and suddenly, and death has occurred in more than one case where 24 or 48 hours before no suspicion of the presence of grave organic disease had been entertained.

Facial paralysis is a most characteristic feature of the malady, and it is probably exceptional for it to be absent, although it may escape observation unless specially looked for.

This arises from the fact that the palsy is so frequently bilateral, and also it is rather a general weakness of all the face muscles than a complete palsy, hence there is frequently no asymmetry of the face. In a series of 20 cases with full records facial palsy is noted in 17 cases; in two no record is made, and in only one is there a definite note that facial palsy was not present at the time of examination. In five cases the facial palsy was unilateral when first observed, and in two of these it became bilateral; in 12 cases it was bilateral when the patient was first seen. Thus in 14 out of 17 cases the facial palsy was bilateral at some period of the illness. The onset of this palsy is often distinctly later than that of the limbs and trunk, and the interval may be as long as four days. The peculiar palsy described above as affecting the limbs, trunk, and face, and sometimes of an ascending type, is the most characteristic feature of the disease, but other palsies may occur. Thus difficulty in swallowing, especially of solids, may occur and in slight degree is not uncommon; palsy of the palate, however, is not common, and the nasal voice and difficulty in the swallowing of liquid such as is seen in diphtheric paralysis is uncommon. The larynx and tongue may be involved, and in one case the symptoms so produced were sufficiently marked for a diagnosis of labio-glosso-laryngeal paralysis to have been made prior to the admission of the patient to hospital. Paralysis affecting the oculomotor nerves must be rare, as the only nerve affected in a series of over 30 cases was the sixth nerve, and this only in one case. No instance of palsy of the third or fourth nerve was seen, and thus ptosis was never observed.

Pain, numbness and tingling, anæsthesia and analgesia are usually present. The sensory loss is usually incomplete, relative rather than absolute, and affecting especially the distal segments of the limbs; its distribution may be of the glove or stocking type. Remissions in the extent of the sensory loss may occur, and the boundary line separating on a limb the normal area from that in which sensation is impaired may vary in position in one and the same case on different days.

*Reflexes, Sphincters, and Cerebral Functions.*

The tendon reflexes are absent in fully established cases, but in the early stages the knee-jerks may still be present at a time when the weakness of the legs is obvious; and in cases of the ascending type the ankle-jerks may be lost at a period when the knee-jerks are still present, although these also are lost later. The plantar reflex is usually lost, but the abdominal and cremasteric reflexes may be retained where the involvement of the trunk is not very marked. When the trunk is more involved the abdominal reflexes are lost. The pupil reflexes and the palatal reflex are not affected.

Sphincters are not usually affected, and even in the most severe and fatal cases the functions of micturition and defæcation may remain normal to the end. Defæcation may be rendered difficult owing to the weakness of the abdominal muscles, and in the early stages of the palsy there may be slight temporary retention of urine, requiring, perhaps, the use of the catheter once or twice. No case requiring continuous catheterisation was observed.

No case with stupor, delirium, or convulsions was observed, and consciousness was always retained even in fatal cases right up to the moment of death; and it was not uncommon for death to be sudden. In one case the patient was certainly inclined to sleep unduly, but he could always be easily roused, and then answered all questions quickly and intelligently. In one case there was some loss of taste and some slight impairment of vision, and examination revealed the presence of a central scotoma. Tachycardia may be a prominent feature and was sometimes the cause of serious errors of diagnosis, as the case was apt to be regarded as one of D.A.H. with neurasthenia. I know of two cases at least where death occurred suddenly in such cases. The urine may contain a small quantity of albumin and the blood shows the presence of moderate leucocytosis; the cerebro-spinal fluid is clear, limpid, and free from cells.

The mortality of the disease is high—8 deaths in a series of 30 cases personally observed. Half the deaths occurred within a week of the onset of the palsy and only one death after the eleventh day. In half of the fatal cases death was due to pulmonary complications; in the remaining cases death was more sudden and, although possibly dependent upon respiratory failure, it was not accompanied with gross pulmonary lesions.

In the cases where recovery took place the improvement in the palsy was slow and gradual, and a period as long as six months may be necessary for the patient to regain his usual health. The palsy is not followed by muscular wasting.

*Remarks.*

Such is a short summary of the clinical picture presented by acute infective polyneuritis. It would seem that the disease is a very definite clinical entity, although both on clinical grounds and from the results of the study of the morbid anatomy it is probable that it is not a neuritis but really a diffuse affection of the nervous system affecting both nerve cells and nerve fibres in the spinal cord, spinal ganglia, peripheral nerves, and to a slight degree the cerebral cortex. It probably has affinities both to poliomyelitis and to encephalitic lethargica, and possibly to other varieties of encephalitis; but one of the most remarkable features of the campaign is that although a fair number of cases of this disease was seen, poliomyelitis was very rare, and I saw no case of encephalitis lethargica until the spring of 1919.

# DIURNAL VARIATIONS IN THE HÆMOGLOBIN CONTENT OF THE BLOOD.

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THE necessity of paying due attention to daily variations in arriving at figures for the normal hæmoglobin content of the blood, a knowledge absolutely essential for the investigation of the blood under physiological and pathological conditions, has already been emphasised by one of us (G. D., 1919). In the same publication it was also pointed out how important it is to examine the person's blood at the time of the day when the smallest daily variations are exhibited—e.g., late afternoon—in order to arrive at a true estimate of normality (cf. Douglas, J. S. C., 1913).

On searching in the literature one is at once struck by the fact that the normal diurnal variations in the hæmoglobin percentage have hardly received any attention. In the paper by Douglas, Haldane, Henderson, and Schneider (1913) the subject is definitely considered and some actual figures are given. These workers record observations made four or five times during the working day, and they noticed in some cases the existence of definite differences. They seem, however, not to have laid any great stress on these changes in discussing their results, nor did they find these changes with any constancy. Indirectly the subject has been approached in the remarkably careful and long series of observations of Lloyd Jones (1887) on the diurnal changes in the specific gravity of the blood. This author pointed out the existence of definite daily variations of the specific gravity, and found usually the highest specific gravity about 9 to 10 A.M., and the lowest between 6 and 7 P.M. In view of our own experiments there seems no doubt that these changes in specific gravity are to a great extent caused by differences in the hæmoglobin content, and it is interesting to note that the times of the day when he finds his highest and lowest specific gravities coincide closely with those where we find the highest and lowest hæmoglobin content.

While what we call normal daily variations of the hæmoglobin percentage have thus been left unconsidered, as of no consequence, a number of observers have investigated the changes in the hæmoglobin or red-cell content caused by exercise (Tornow, 1895; Willebrand, 1903; Hawk, 1904; and Boothby and Berry,

1915), fluid intake (Haldane and Priestley, 1916), the position of the body (Jörgensen, 1917), and so forth. Changes in position are stated to have no effect on the red-cell content, though a marked one on the number of white corpuscles, but most observers have found that violent exercise results in a concentration of the blood. It seems, however, hardly possible to form an accurate opinion of the actual changes taking place unless the diurnal variations are duly considered. In fact, some findings in the literature regarding changes in the hæmoglobin percentage seem to be most naturally explained as due to these diurnal variations. The subject here dealt with has been under investigation for several years in connexion with various researches by G. D. and his co-workers, though the only hitherto published figures are those contained in the paper by one of us (H. C. B., 1919), in which one curve was given for comparison with pathological cases.

*Method Employed.*

The technique used has been developed by one of us (G. D.), and has been used in the Department of Pathology at Oxford for all work dealing with the blood and hæmoglobin for the last 10 years. As no accurate description has so far been published we shall give shortly the details of the procedure. Its advantage is accuracy combined with entire absence of knowledge of the results while readings are being taken, thus entirely excluding personal bias.

*Measuring pipettes.*—The pipettes used are capillary pipettes drawn from glass tubing of about 6 mm. diameter. It is drawn out to form a capillary tube of such proportions that a length of about 15 cm. corresponds to a volume of 0·1 c.cm. The end of the pipette is cut off sharply and squarely, and it is then graduated by means of mercury measured out from an accurately standardised 0·1 c.cm. pipette. The 0·1 c.cm. of mercury is thus used to graduate a large number of pipettes, which are thrown away after the blood has been measured. For taking the quantity of saline required for the dilution of the blood a 20 c.cm. pipette is employed, in which each cubic centimetre is graduated in 1/10ths.

*The blood sample.*—If the sample be taken from a finger it is absolutely essential that the capillary circulation should be free and normal, and not restricted as the result of cold or congestion, which produce readings above those obtained from venous samples (cf., Gibson, 1909). No squeezing should be allowed, and the blood should drop freely and have a natural bright colour. Only when this is done is it possible with any degree of certainty to obtain identical results when capillary blood is compared with blood drawn directly from a vein. Five or six drops are now collected into a freshly paraffined watch-glass and the dilution made immediately. While drawing up the blood into the capillary pipette it is necessary to agitate the watch-glass gently and continuously to prevent sedimentation of red cells, which takes place very quickly, and if this point is disregarded very considerable error will be introduced, while otherwise dilutions made from the same drop will give exactly identical readings. In the case of human bloods a dilution of 1 in 200—e.g., 0·1 c.cm. of blood in 19·9 c.cm. of normal saline—is convenient, while in the case of goats and rabbits a dilution of 1 in 150 is preferable owing to their lower hæmoglobin content. Immediately after dilution the blood suspension is carefully mixed, and the tubes with diluted blood are then left in the cold store (or a cool place) and are not hæmolysed until immediately before they are read. As the hæmolytic agent, dry saponin is added (about as much as can be taken up by the terminal millimetre of a penknife). The tubes are then gently rotated and left in a warm room, or preferably in a water-bath at about 30° C., for a few minutes until complete hæmolysis of the red cells has taken place. Before taking readings one should ascertain that the hæmoglobin solution is perfectly clear. The non-hæmolysed diluted red cells can with safety be kept in the cold store at a few degrees centigrade for 24 to 48 hours without showing any change, while the hæmolysed blood kept under the same conditions shows a definite drop in the hæmoglobin content within the same time.

*The taking of the hæmoglobin readings.*—For all readings a Duboscq colorimeter is used. To secure accuracy and comparable results from day to day it is absolutely necessary to secure an even illumination on the two halves of the fields. To ensure this, and at the same time to secure a greater delicacy of reading, it is to be recommended always to use a yellowish artificial light in a dark room. The light should be so shaded that only the reflecting mirror is exposed to the light rays. It is always necessary on each occasion to determine the actual difference in reading obtained by filling both cups with the same hæmoglobin solution, and in the calculation of the experiments to allow for these differences. If these details are scrupulously observed it is possible to obtain readings where the mean deviation is not greater than 0·3 per cent., when different hæmoglobin solutions are being read against each other. When a series of hæmoglobins is being compared, one of the samples is poured into the one cup and the other samples are in succession read against it. In the dilution of blood recommended a height of 10 mm. on the vertical measuring scale will give a good colour intensity for allowing accurate comparison. If too weak or too strong a colour is used the accuracy of the readings suffers considerably.

To secure and maintain an unchangeable standard from day to day and year to year, one or more of the bloods are finally read against a standard glass of suitable colour, and in this case it is absolutely necessary to use artificial light rich in yellow rays to obtain a perfect match of colour quality.

The advantage of using a Duboscq colorimeter is that it leaves the observer in absolute ignorance of the numerical reading until he has finally matched the colour, and therefore eliminates the personal equation, a factor of the greatest importance where minute changes have to be ascertained.

*Observations.*

The observations recorded in this paper have been carried out on goats and men. In the case of goats all blood samples have been taken by introducing a hollow needle into the external jugular vein and collecting the blood in a paraffined watch-glass as described above. In the case of men the samples have been taken in some of the experiments entirely from an arm vein, using a fine needle and a dry syringe, and in others by puncture of the back of a finger near the root of the nail. In a few experiments samples have been taken by both methods as nearly as possible at the same time, and in no case where the circulation has been free and normal, as already stated, has any difference been observed.

To exclude as far as possible the effects of feeding and rest, &c., on the curves, these conditions have been varied in different experiments, with the result that similar curves have been obtained under very diverse conditions. In men the changes found in the course of a long experiment in which no rest was taken for over 30 hours correspond fairly closely with others obtained when the individual was kept entirely at rest in bed, though the exact times for the rise and fall of the curves seem to be somewhat shifted in one direction or the other by the varied conditions. In all cases the times are given in real time, and we do not think that the change from ordinary time to "summer time" has produced any definite shifting of the curve. Even in one surgical patient in bed with marked excursions of temperature the general shape of the curve conformed to the normal type.

These points are brought out clearly by the five curves reproduced, four on men and one on a goat.

Curves 1, 2, and 3 (Fig. 1) are from different individuals within the same period of 25 hours, all the samples being taken from the arm veins without congestion. Curve 4 (Fig. 2) is from the same individual as curve 3, the samples being capillary blood obtained on another occasion by pricking the fingers. In the case of curves 1, 2, and 3 the persons stayed up the whole of the night without sleep or rest owing to the pressure of work. In the case of curve 4 the subject had a long night in bed, got up late, and did no work during the day. Although woken up at hourly intervals during the night, he slept well between the times when the blood samples were taken.

The most striking feature about curves 1, 2, and 3 is that, though the excursions between the highest and lowest readings show considerable variations, the general configurations of the curves are very similar, and the times of rise and fall are approximately the same. Towards the end of the experiment on subject 2 four control determinations were done by taking also capillary blood samples from the finger, which are represented by the broken line on the curve. The almost perfect correspondence between the two series of samples is evident. As a further control on many occasions two samples of blood have been taken with as short an interval as possible between them, and identical readings have usually been obtained, while a divergence of more than 1 per cent. has been extremely rare. Experimental errors are therefore probably slight.

A comparison of curves 3 and 4 shows a general similarity in character for the same individual on different occasions, though the contour seems to have been somewhat shifted to

one side or the other; and it is also to be remarked that the absolute excursions to be noticed from the highest to the lowest readings are very much greater in curve 4 than in curve 3, reading as much as some 15 per cent. The subject whose changes are given in curve 2 was also examined over part of the time corresponding to the experiment reproduced

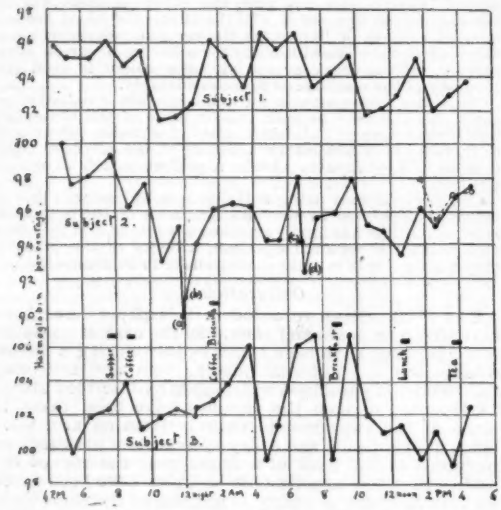


FIG. 1.—Curves 1, 2, and 3 are all from venous samples in men. Interrupted line at the end of curve 2 indicates control observations on capillary samples. All three individuals took their meals as indicated in the figure. Subject 2 was lying down from 12.36 to 12.56 A.M. when sample (a) was taken, sample (b) being taken at 12.59 after standing three minutes. The same subject lay down from 6.42 to 6.52 A.M. when sample (c) was taken, sample (d) being taken at 6.58 after standing six minutes.

in curve 4, and again the time relations of the rise and fall were very similar in the two subjects, who lived under the same conditions as regards meals, though considerably different as regards rest. Any shift in the curve was therefore apparently the same in the two individuals.

The curves reproduced in this paper are merely samples taken from a large series of observations made on a number of different individuals. In all of the curves reproduced for man the subjects were males.

From these curves it will be seen that the distance between the various highest and the various lowest points correspond

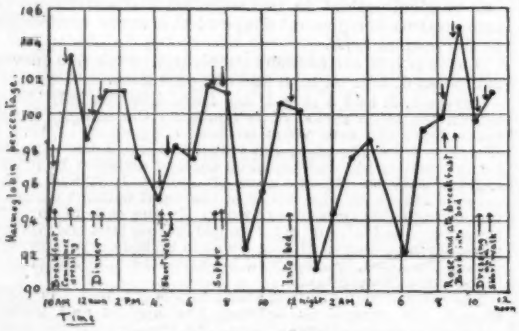


FIG. 2.—Curve 4. Capillary samples from subject 3 on another occasion.

approximately to some four to six hour intervals, and while usually the lowest readings are found somewhat near midnight the highest readings are obtained in the mornings between 8 and 10, or in evening about the same time. During the working day the lowest values occur in the early evening, and there is therefore a general agreement with the results of Lloyd Jones, who found the lowest specific gravity about that time.

In curve 5 (Fig. 3) is represented one series of observations on a female goat; this curve is only a single illustration of a number of observations made on different goats in connexion with other investigations carried out by two of us (G. D. and H. F. P.), which will be published later. In the goat the same general configuration of curve is to be found as in the case of man; though the exact hours do not absolutely coincide they fall fairly close together. Again, here we trace four to six intervals between the various highest and the various lowest points. The excursions are very considerable, even showing as much as 30 per cent. increase from the lowest to the highest reading, and that the changes may take place very rapidly is shown by the fact that within two hours an increase of some 23 per cent. is found, followed by a similar decrease within the next two hours.

There is some evidence that the female sex exhibits greater daily variations than the male.

### *Discussion of Results.*

From the curves published it must become evident that in any kind of research dealing with observations where blood changes caused by extraneous influences are studied, it is absolutely essential to give the greatest possible consideration to diurnal variations in the concentration of the blood as shown by changes in the hæmoglobin percentage. If this is not done it is hardly possible to draw true and correct conclusions as to the real nature of any variations found. It is not unlikely that in view of the marked diurnal changes normally taking place we may have to reconsider results already obtained in a number of observations dealing with the blood and circulation, and it is also probable that some of the phenomena that have hitherto been veiled in obscurity may be more readily understood.

At the present moment we are unable to offer any rational explanation of these diurnal variations, though

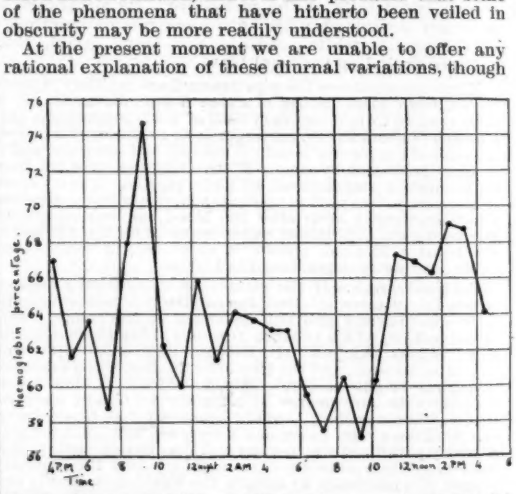


FIG. 3.—Curve 5. Jugular vein samples from a goat. Animal fed each day at 3.45 P.M. and allowed access to food and water the whole time of the experiment.

there is strong evidence that they are closely connected with variations in pulse-rate, blood pressure, rate and volume of respiration, and possibly with fluid absorption or kidney secretion, though it would be premature to attempt to express an opinion as to which is the primary factor in bringing about these changes. We do not consider that the suggestions put forward by one of us (H. C. B.) in the preliminary communication already quoted afford an adequate explanation of the facts in the light of this extensive series of observations.

In connexion with what we have put forward it is worth mentioning that changes produced by cold in the capillary circulation greatly resemble those found during shock by Cannon (1917), though his views regarding changes in colour index must be taken with some reservation until they have been confirmed by experiments with improved methods. It is also worthy of notice that some of the data for diurnal variations in the rate of kidney secretion given by Leathes (1919) show some similarities with the times when changes in the concentration of the blood occur, though any interdependence of the two remains unproved.

### *Conclusions.*

1. The diurnal variations in hæmoglobin percentage met with in man and animals are very considerable and may even reach as much as 30 per cent., while 10 per cent. changes are of more or less common occurrence.

On an average the excursions seem to be more marked in individuals or animals with a low hæmoglobin content of the blood.

2. In attempting to establish the normal hæmoglobin content in a series of individuals it is essential to take the observations at a time of the day when the daily variations are found to be the smallest—i.e., late afternoon between 5 and 7 P.M.

3. In the study of any phenomena where alterations in the concentration of blood are concerned it is necessary to view them in the light of the marked normal diurnal variations that may occur.

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# RUPTURE OF CÆSAREAN SECTION SCAR IN SUBSEQUENT PREGNANCY OR LABOUR.*

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AN obstetric surgeon has seldom to face an accident of pregnancy or labour more disturbing to his peace of mind than rupture of the scar of a former Cæsarean section. My interest in the subject has been excited by the following series of events in the obstetrical department of the London Hospital. In November last I operated on a patient almost moribund from the effects of rupture of the scar of a Cæsarean section performed in 1915; in February of this year I saw in the post mortem room a patient dead from abdominal sepsis consequent on rupture of the scar of a Cæsarean section I had myself performed in 1916, and in the years 1915 and 1916 three other of our Cæsarean section patients got rupture of their scars. The occurrence of five of these treacherous accidents in five years has made a very great impression on the minds of myself and my colleagues.

On inquiring into the subject I was impressed with the fact that we possessed very little information about rupture of the scar, either as to its causes, or, far more important, as to the frequency with which it occurred. At the outset I was struck by the wide divergence of opinion amongst the few with whom I talked or corresponded. On the one hand, I was told that rupture of the scar was more or less of a myth; on the other hand, I learned that certain outstanding surgeons—the Camerons of Glasgow, for example—were so afraid of ruptured scars that their invariable custom was to sterilise their patients at the first operation. Further inquiry proved that rupture of the scar was no myth, but was a real menace; I heard of recent cases in London and elsewhere; about a hundred cases had already been reported in the obstetrical literature of Europe and America. Obviously the subject required investigation. It seemed, above all, imperative to find out what was the actual frequency, the real risk, of rupture. Quite apart from the importance of this information to obstetric surgeons, patients themselves might wish to know what sort of obstetric future they were likely to have after submitting themselves to Cæsarean section. It seemed all the more important to get exact information in view of the increasing frequency with which the operation is being performed; its modern indications form an ever-growing list. There is another point: many patients who nowadays have had Cæsarean section have nothing to prevent them, in the event of a future pregnancy, from delivering themselves by the natural passages—a very different thing from the days when pelvic contraction was almost the only indication, when a repeated operation was the only way of future delivery, and when scars were seldom strained by labour.

If, on inquiry, the risk of scar-rupture was revealed to be a negligible one, then we could, with clear consciences, go on advising and performing the operation according to its extended indications; but if the risk turned out to be an appreciable one, then we should be forced to seek safety either by limiting the indications or by contriving an operative technique which would give a more dependable scar.

I have divided my paper into three sections: (1) An account of five new cases. (2) A general discussion on the ætiology and anatomy of ruptured scars and an analysis of the literature. (3) The results of a follow-up inquiry into the subsequent obstetric history of a large number of Cæsarean section patients operated on between 1912 and 1918.

## 1. AN ACCOUNT OF FIVE NEW CASES.

The details of the five new cases, from the London Hospital, are as follows:—

CASE 1.—Cæsarean section, 17/4/14, by Dr. Russell Andrews. Primigravida, aged 22, with extreme contraction of the pelvic outlet. Entered hospital early in labour at term. Uterus opened by anterior median incision; sutured with two layers of chromic catgut, a deep buried one including whole thickness of the muscle and missing endometrium, and a continuous peritoneal suture. Living child, weight 6¾ lb. Recovery good, temperature not above 99·4° F. during first four days, and afterwards not above normal.

Readmitted 13/8/15, with rupture of scar. No intervening pregnancy. Last menstrual period 11/11/14. Pain began suddenly on 13/8/15 at 2.30 A.M.; a continuous cramping pain which doubled her up made her vomit and faint. Admitted at 8 A.M., anæmic, pulse 120; was in continuous abdominal pain, uterus very tender and hard, abdominal muscles rigid, fœtal heart not heard; no labour pains, no external hæmorrhage. Concealed accidental hæmorrhage diagnosed. Laparotomy by the late Dr. Drummond Maxwell. An ovoid rupture, 1½ inches long, was seen in upper part of uterine scar. Placental tissue protruded through the rupture, and blood was oozing from it; about 2 pints of blood in peritoneal cavity. The uterus, with the ovum in situ, was removed by subtotal hysterectomy, and patient made a good recovery.

CASE 2.—Primigravida, age 19, admitted 26/7/14 with eclampsia, in thirty-eighth week of pregnancy. Before admission had already had five convulsions; between 5 A.M. and 11.30 A.M. had convulsions every half hour; treated with morphia, venesection, and intravenous saline. After temporary improvement convulsions increased in severity and frequency. At 2.30 P.M. Cæsarean section by Mr. Gordon Luker; labour had already started. Uterus opened by anterior median incision. Recently dead 7½ lb. fœtus delivered. Incision sutured with two layers of chromic catgut, deep and superficial. Convalescence febrile; temperature rose daily to 102° F. for first four days, for next seven it ranged between 100° and 103°. Patient was discharged well on 16/8/14; abdominal wound healed by primary union.

Readmitted 19/11/15 in state of collapse in eighth month of second pregnancy. Laparotomy by Dr. Drummond Maxwell; dead fœtus and much blood in peritoneal cavity; rupture through scar of former Cæsarean section; placenta lay almost completely outside uterus, being still attached to one side of rent. Uterus removed by subtotal hysterectomy, but patient died shortly afterwards.

Description of the uterus: A uterus with a long, widely gaping rupture through anterior wall. Outside measurements of uterus: Length, 14·5 cm.; greatest width, 14 cm. Measurements of rupture: Length, 10·5 cm.; width at upper end, 7 cm.; at lower end, 5 cm. Thickness of uterine wall at edges of rupture, 2 cm. near the upper end, decreasing to 1·5 cm. near lower end. Continuous with the lower angle of the rupture is a linear thinned area in the uterine wall 2·5 cm. long; this is the unruptured part of the scar and is only 0·5 cm. thick. The edges of the uterine wall at the site of rupture are for the most part rounded and smooth. At first sight the impression is got that the whole thickness of the

* A paper read before the Obstetrical Section of the Royal Society of Medicine, May, 1920. Full table of cases of Cæsarean Section used in the collective investigation, as well as short abstracts of all reported cases of rupture of the scar, will be published in the Proceedings of the Royal Society of Medicine.

uterine wall had been torn through, but closer inspection shows that the decidual lining of the uterine cavity is continued up over these rounded edges and reaches in most places very close to the torn peritoneum. (See Fig. 1.) At the upper and lower ends of the ruptured area decidua and peritoneum almost meet. The irregularly torn peritoneal layer overhangs liberally the thick decidua-covered edges. (Fig. 2.) In the middle two-thirds, on both sides, is a well-defined subperitoneal hæmatoma stripping the peritoneum for some distance from the underlying uterine wall. Firmly adherent to the middle third of the whole thickness of the left edge of the ruptured area is a piece of placenta, covered by loosened peritoneum and a subperitoneal hæmatoma. (See Fig. 2.) On the opposite edge the decidual layer is absent and is replaced by a roughened area covered with broken laminæ of clot; this

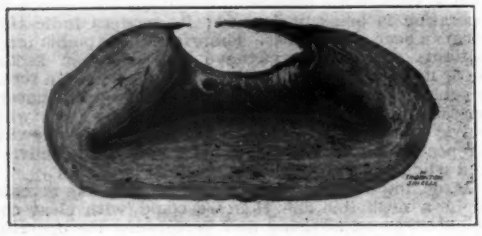

FIG. 1.—Drawing of section through upper third of uterus. Note—(1) Broad rounded edges of ununited muscle; (2) the decidua covers these edges and reaches almost to the peritoneum; (3) the narrow band of tissue between peritoneum and decidua on the right side, through which rupture has occurred; (4) the over-hanging flap of wide thin scar area, consisting of little else than peritoneum.

FIG. 2.—Drawing through middle of uterus. Note, in addition to points in Fig. 1—(1) Insertion of a piece of placenta into left edge of ununited muscle edge; (2) subperitoneal hæmatoma; (3) the broad thin scar area has torn through at one edge and not along its middle.

evidently represents part of the placental site. There are the remains of many thick omental adhesions to the peritoneum over the ruptured area. These findings are to be interpreted as follows. (1) The real scar, through which the rupture occurred, is extremely thin, and consists of little more than stretched peritoneum with here and there a thin layer of fibrous tissue. In its original state, before rupture, no doubt this thin peritoneal scar was covered beneath with decidua. (2) The thick edges of the ruptured area are the ununited muscle wall of the uterus, covered with decidua, except where they enter into the placental site. (3) The placenta was inserted over the scar and into the thick ununited muscle edges. (4) Retroplacental hæmorrhage probably occurred beneath the stretched scar before rupture occurred; in fact, retroplacental hæmorrhage may have been the determining cause of rupture.

CASE 3.—Cæsarean section, 26/3/14, by Dr. Russell Andrews. Patient aged 28, with flat rickety pelvis. Former labours: (1) 1911, instrumental dead-birth; (2) 1912, instrumental live-birth. Last menstrual period, 14/8/13; admitted in thirty-second week of pregnancy, on 26/3/14, after 18 hours in labour; os uteri two-fifths dilated, membranes intact, transverse presentation; head found too large to enter pelvic brim, so Cæsarean section performed; uterus opened by usual anterior median incision; sutured with two layers of chromic catgut, a deep buried one including whole thickness of muscle and missing endometrium, and a continuous peritoneal suture. Child alive; weight, 5½ lb. Convalescence febrile, temperature rising daily for 13 days to 100° or 101° F.

Readmitted early in fourth labour on 16/3/16, thirty-two weeks pregnant. Labour pains began at 2.30 P.M. At 6 P.M. spontaneous rupture of the uterus, accompanied by collapse, pronounced anæmia, cessation of labour pains, and distinctive feeling of fœtus beneath abdominal wall. Immediate laparotomy; dead fœtus, placenta, and much blood were in peritoneal cavity. Scar ruptured in entire length; uterus removed by subtotal hysterectomy. Next day patient got left hemiplegia, but ultimately made good recovery

CASE 4.—Rickety flat pelvis. Preceding obstetrical history: 1. Instrumental labour at term; dead-birth. 2. Instrumental labour at term; child lived a few hours. 3. Instrumental labour at term; dead-birth. In fourth labour at term patient admitted on 11/10/14, and Cæsarean section performed by the late Dr. Drummond Maxwell; anterior median incision, sutured with two layers, deep and superficial, of chromic catgut. Child alive, weight 6½ lb. Convalescence febrile; temperature rose to 102·8° F. on second day, and varied between 100° and 103° until seventh day, after which it gradually fell.

Readmitted in fifth labour, at term, in 1916. Head engaged in pelvic brim; forceps applied, and a healthy child of 7 lb. delivered. Puerperium febrile; temperature rose to 103° on fourth day, fell by lysis, and reached normal on ninth day.

Readmitted in sixth pregnancy with rupture of uterus on 8/8/19; last menstruated on 1/12/18. At 12 o'clock, midday, whilst sitting in a chair, suddenly got intense abdominal pain and fainted; her friends summoned assistance at 3 P.M. She was found in last stages of collapse, and was immediately transported to hospital. On arrival was profoundly anæmic and collapsed; abdomen distended and extremely tender; fœtus felt with remarkable distinctness, and what was surmised to be empty uterus was felt reaching to umbilicus. Immediate operation by Mr. Eardley Holland, under stovaine spinal anæsthesia; dead fœtus and much blood found free in peritoneal cavity. The placenta was almost completely separated, and lying just outside a large gaping rent in anterior wall of uterus, a very small part being still attached near the left edge of the rupture. After removing fœtus and placenta attention was turned to the uterus, which was rigidly contracted and anæmic, with a long, widely gaping rupture occupying almost whole length of anterior wall. The rupture looked like a clean tear, except at its upper and lower ends, where it had extended laterally to a slight extent. Its edges were thick and smooth, giving the false impression that the rupture had occurred through the entire thickness of the uterine wall. Projecting from the thick edge of one side was a ragged leaf of thickened peritoneum, about 1 cm. wide; this was in reality the stretched scar, and it had ruptured, not along its middle, but along its junction with the opposite thick edge. There had been a complete failure of muscular union, and the ununited muscle formed the two thick edges. The rupture was rapidly closed with a single layer of interrupted sutures of No. 3 silk, placed about ½ cm. apart, and including whole thickness of uterine wall except endometrium. Patient made an excellent recovery. For first week evening temperature rose to 100°, but there was no other trouble.

CASE 5.—Cæsarean section, 26/2/17, by Mr. Eardley Holland. Primigravida, age 20, admitted with eclampsia in thirty-sixth week of pregnancy. Had three convulsions before admission, was comatose, and urine, on boiling, was solid with albumin; cervix intact, no labour pains, fœtal heart heard. Cæsarean section under stovaine spinal anæsthesia; uterus opened by anterior median incision, fœtus dead, placenta posterior. Incision closed with No. 3 interrupted silk sutures, placed about ½ c.m. apart, including whole thickness of uterine wall except endometrium; this layer was covered with a continuous peritoneal suture. Convalescence febrile; temperature ranged between 100° and 102·6° F. for first seven days, lochia offensive; abdominal wound healed by primary union.

During second pregnancy was a regular attendant at antenatal department. Last period 28/5/19; urine never contained albumin, and health excellent. Was admitted again on 17/1/20, with severe puerperal sepsis following premature confinement. Only an imperfect history could be obtained; labour was completed in a few hours on 11/1/20; placenta retained, and was removed manually, with difficulty, two hours after birth of child, which lived only a few hours. The following day she got abdominal pain and dyspnœa, and was sent into hospital. On admission into septicæmia ward on 17/1/20 was extremely ill; temperature 104°, pulse 120, abdomen rigid and tender, constant diarrhœa. She was considered to have puerperal septicæmia, but blood cultures taken on different occasions were sterile. Perineum completely ruptured into rectum. For a fortnight she held her ground and even improved slightly in her general condition. Abdominal section was considered and rejected. The discharge from her uterus became more and more offensive, and was ultimately fæcal in character. She died on 16/2/20.

Post-mortem examination notes: General purulent peritonitis, with localised abscesses. Fibrous peritoneal adhesions at fundus of uterus, between bladder, uterus, and small and large intestines. Pus tracking up right and left sides of abdominal cavity. Localised subdiaphragmatic abscess in antero-superior surface of right lobe of liver. Perforation 1 cm. in diameter in wall of small intestine, 240 cm. below duodeno-jejunal flexure. Dense fibrous peritoneal adhesions with pus pockets between lower coils of small intestine and uterus. Rounded perforation 3 × 2 cm. on anterior wall of fundus of uterus. Dirty-green diphtheroid inflammation of endometrium. Dilatation with purulent content in Fallopian tubes. The pelvic viscera were removed en masse, and showed the following details. Uterine cavity 7 × 4 × 4 cm. The rupture measured 3 × 2 cm., with rounded and smooth edges; the right edge was 1·5 cm. thick, and the left 0·5 cm. The scar had ruptured in its lower two-thirds; the unruptured part, which could be seen and felt as a thin furrow on the inner surface of the anterior wall, was 1·8 cm. long; remains of many old firm adhesions over anterior surface and fundus of uterus, one particularly broad and firm one covering unruptured part of scar. Left half of uterovesical pouch of peritoneum obliterated by dense adhesions between bladder and uterus; to right of mid-line it was occupied by an abscess cavity with fæcal contents. This abscess communicated with the already-mentioned tear or perforation in the small intestine and with the uterine cavity, through the rupture. Thus, there had been a utero-intestinal fistula. Whether the intestine was injured at the time the rupture occurred, or whether the perforation arose subsequently, cannot be said for certain; I favour the former view.

A point of special interest in this case is whether the scar ruptured spontaneously during labour, or whether it was ruptured during the difficult manual removal of the placenta. In the light of other reported cases I am inclined to think it ruptured during labour, and that the retention of the placenta, as well as the difficulty of its removal, was due to its partial escape into the peritoneal cavity.

## 2. ÆTIOLOGY AND PATHOLOGY OF RUPTURED SCARS: REVIEW OF THE LITERATURE.

I have found accounts of 92 cases, reported in sufficient detail to make them worth collective study, and have made a short abstract of the essential facts of each case. I have omitted a few cases to which I found references, but of which I could neither get at the original report nor find reliable abstracts. It is obvious, too, that many cases have never been published at all; speakers in discussions before societies on the subject of ruptured scars often refer to such cases, personal or otherwise. Up to a point, references to cases were not hard to find, and I am indebted to other writers who have published collections of cases, especially to L. Singer (1909), Albert Wyss (1912), Palmer Findley (1916), and E. Schroeder (1916).

The classical operation dates from 1882, when Sänger and others published their suture methods. I need hardly state that I have not included cases of ruptured scar following the operation of pre-suture days; one-half of the minority who survived this operation got a ruptured scar in the unfortunate event of a future pregnancy. The first case in my list, Koblank's, occurred in 1891, and more than two-thirds have been reported since 1910, coinciding with the period when the indications for Cæsarean section began to be extended. Unfortunately, all cases are not found reported in full detail; but amongst the sum of the cases the data are in sufficient number to indicate the chief factors favouring rupture of the scar. I have isolated the essential points of these 92 reported cases and of my own five in the following summary, so that the extent to which each one occurs can be conveniently noted and its individual importance estimated.

### *Summarised Analysis of Reported Cases.*

*Parity.*—Rupture occurred in the second pregnancy in 54 cases, the third in 19, the fourth in 10, the fifth in 6, the sixth in 3, the eighth in 1; number of preceding pregnancies not mentioned in 4.

*Indications for Cæsarean section.*—Contracted pelvis in 64 cases; eclampsia in 12; nephritis, albuminuria of pregnancy, fibromyoma of uterus, hæmatoma of vagina and vulva, sacral tumour, stricture of cervix, vaginal varices, shoulder presentation, concealed accidental hæmorrhage in 1 each; dermoid cyst of ovary in 2; indication not mentioned in 10.

*Cæsarean section incision.*—Anterior median in 54 cases, posterior median in 1, transverse fundal in 28, anterior median and transverse fundal (repeated operation) in 1, cervical in 1, site of incision not mentioned in 12.

*Relation of incision to placental site at Cæsarean section.*—Incision through placental site in 10 cases, not through placental site in 6, placental site not mentioned in 81.

*Suture material.*—Catgut in 41 cases, silk (often with continuous catgut for the peritoneum) in 12, reindeer tendon in 1, suture material not mentioned in 43 cases.

*Fever or sepsis during recovery from Cæsarean section.*—Recovery febrile, or abdominal or uterine infection, in 51 cases; recovery stated to be afebrile in 15 cases; no details mentioned in 31.

*Interval between Cæsarean section and rupture.*—Less than one year in 2 cases, one year in 12, two years in 25, three years in 21, four years in 13, five years in 3, six years in 3, more than six years (including one of 11 and one of 12) in 4; interval not stated in 14 cases.

*Number of Cæsarean sections preceding rupture.*—One in 88 cases, two in 6, three in 2, number not mentioned in 1 case.

*Number of labours intervening between Cæsarean section and rupture.*—None in 85 cases, one in 8, number not stated in 4 cases.

*Period of pregnancy at which rupture occurred.*—At term in 47 cases, near term in 6, 8½ months in one, 8 months in 10, 7½ months in 1, 7 months in 8, 4 months and again at 7 months in 1, 38 weeks in 3, 37 weeks in 2, 36 weeks in 4, 32 weeks in 2, in early pregnancy in 1, at 11 months (post-mature) in 1, period not stated in 10.

*Whether rupture occurred during labour or before the onset of labour.*—In labour in 19 cases; in labour, early in first stage, in 29; during pregnancy, before the onset of labour, in 36; no details given in 13.

*Relation of placenta to scar at time of rupture.*—Placenta implanted over scar in 34 cases, placenta not implanted over scar in 17, placental site not mentioned in 46.

*Accidental factors likely to have been exciting cause of rupture.*—None mentioned in 80 cases, hydramnios in 2, twins and hydramnios in 1, version in 2, induction and version in 2, accidental hæmorrhage in 1, an accident in 1, difficult breech labour in 1, post-mature fœtus in 1, fœtus excessively large in 1, placenta prævia (hydrostatic bag) in 1, pituitrin in 1, pituitrin and obstructed breech labour in 1, manual removal of placenta in 1, long labour with contracted pelvis in 1.

*Extent of rupture.*—Rupture of entire or almost entire length of scar in 67 cases; rupture of small portion only of scar in 22; extent not mentioned in 8.

*Treatment of rupture.*—Hysterectomy (subtotal) in 56 cases; vaginal hysterectomy in 2; suture, sometimes with excision of edges, in 26; drainage in 2; treatment not stated in 1; death before operative treatment in 10.

*Result to mother.*—Lived in 66 cases, died in 28, not mentioned in 3.

*Result to child.*—Dead in 69 cases, lived in 21, not mentioned in 7.

### *The Anatomy of the Uterine Scar.*

(A) *Perfectly healed scars.*—Perfect healing of the uterine incision may result in complete muscular regeneration, leaving no trace of scar tissue except on the peritoneal surface.

Whitridge Williams has studied the cicatrix in 10 uteri, removed by Cæsarean hysterectomy, which had been subjected to Cæsarean section upon one or more previous occasions. In 8 of his specimens (one of which had been subjected to two, and another to three, previous Cæsarean sections) it was difficult to find the old cicatrix by examination with the naked eye; the only indication of its existence was the presence of slight vertical depressions upon the external and internal surfaces of the uterus. Microscopical examination revealed the entire absence of scar tissue in the uterine wall, and showed the muscle fibres extending across the site of the old incision as if it had never existed. It is interesting to note that the convalescence from the previous operations had been uncomplicated.

In another specimen deep furrows existed on the external and internal surfaces of the uterus, the two being separated by a band of tissue 3 mm. thick, in contrast to the adjacent uterine walls, which measured 2·5 cm. in thickness. The external furrow was covered with peritoneum and the internal was lined with typical decidua; the intervening tissue was normal muscle, showing no trace of scar tissue, and differing from the normal only by its thinness. The history of this patient was that the convalescence had been stormy.

(B) *Thin scars.*—Light is thrown on the causes and anatomy of ruptured scars by studying scars that are thin, for it is only thin scars that are likely to rupture. A thin scar becomes progressively stretched and thinned during pregnancy owing to the increasing distension of the uterus.

Thinning of the scar, as found at a repeated Cæsarean section or in a uterus removed for some reason from a patient who has formerly had a Cæsarean section, is not at all uncommon; every obstetric surgeon of experience has encountered it. Harrar, at the New York Lying-in Hospital, found that in 50 instances of the repeated operation in 42 the old scar was either not found at all or, if found, was solid, in 4 there was marked attenuation, in 2 there was partial rupture at the location of the old scar, and in 2 there was complete rupture. Van Leuwen collected all cases of repeated operation reported in literature down to 1903, and found thin scars reported in 20 out of 117 cases. These figures probably represent cases of extreme thinning only. A moderate degree of thinning or extreme thinning of a small portion of the scar is, in my experience, much more common than this if looked for by palpating the whole length of the scar, after the uterus has been emptied, between a finger within and a finger without the uterus. By various writers these wide, thin scar areas, as found at repeated operations, have been described as, "as thin as paper," "only 1 to 2 mm. thick," and have sometimes been mistaken for the bulging amnion herniated through the scar. Sometimes a subperitoneal hæmatoma has been observed—an indication of imminent rupture.

There are, of course, varying degrees of thinning of the scar. Sometimes it is extreme, sometimes moderate; sometimes the entire length of the scar is affected, sometimes only a part. The only case I have found recorded in which the thin scar consisted of normal muscle is that of Whitridge Williams, to which I have already referred. In all others it was composed of scar tissue, often with a varying proportion of muscle fibres scattered through it. In my own second case the unruptured part of the scar consists almost entirely of scar tissue, but muscle fibres, singly or in groups, are scattered through it, and have even grown right across its whole width. In cases of extreme thinning the attenuated scar area consists merely of peritoneum in contact with decidua, with a few intervening strands of fibrous tissue. These attenuated peritoneo-decidual scars are just the ones liable to rupture during pregnancy or labour from a rise of intra-uterine pressure. The point of greatest importance about these scars is that the uterine muscle has completely failed to unite; the sutures employed to close the incision either slough out or cut out, and the muscle surfaces retract and become widely separated. The peritoneum, on the contrary, holds firm. The retracted muscle surfaces later become smooth and rounded and in course of time covered by a layer of endometrium, which in a subsequent pregnancy is converted into decidua. The endometrium grows also across the line of the scar beneath the peritoneum and

covers the inner surface of the gap. Further thinning of this peritoneo-decidual scar is the natural sequence of the distension of the uterus during pregnancy.

The analogy between such a scar and a defective abdominal scar is irresistible; the one consists of peritoneum and decidua, and the other of peritoneum and skin; in both the muscle is wanting. In some cases even peritoneal union has been demonstrated to have failed in parts of the scar, and the gaps have been plugged by adherent omentum or even bowel. Excellent histological studies of thin scars have been published by Couvelaire, Offermann, Spalding, and others.

(C) *Ruptured scars.*—There is no doubt that when the scar has ruptured it has nearly always been one of the thin scars described in the foregoing section. The peritoneo-decidual scar has gradually become converted into a widely stretched area during the progressive uterine distension. When this thin area ruptures it has usually been noticed that the line of rupture does not occur along its middle, but at the sides, near the thick part of the uterine wall. A thick or even a moderately thick scar, whether composed of fibrous or muscular tissue or both, does not rupture except under extreme provocation, such as obstructed labour.

The appearance of a ruptured scar, after the uterine contents have escaped and retraction has occurred, is deceptive and has, in the earlier observed cases, led to wrong descriptions and tortuous explanations. The deceptive feature is the thickness of the edges of the ruptured area. These edges, as already pointed out, consist of the ununited muscle surface covered with decidua. After the uterus is emptied and retracted these muscle edges become equal in thickness to the rest of the uterine wall. Furthermore, these thick edges, since chorion or placenta has been separated from them, are either found oozing blood or covered with pieces of blood clot. In fact, their appearance is almost exactly as if the whole thickness of the uterine wall had been newly torn through, whereas in reality it is only the stretched deciduo-peritoneal area that has given way. The true state of affairs is illustrated in Figs. 1 and 2, where the decidua can be followed from the uterine cavity over the ununited muscle edges almost up to the ruptured peritoneal coat. In my own fourth case, where I sutured the rupture, I believed I was suturing thick, recently ruptured surfaces; it is only in the light of the experience from my second case and of cases reported in the literature that I now realise I sutured together the old ununited muscle surfaces.

### *Liability of Uterine Incision to Yield Shortly After Operation.*

It is not often that Cæsarean section cases come to post mortem, and it is even rarer for a case to be reopened for hæmorrhage or sepsis. In such cases it is surprising how often there has been observed a yielding of the incision from the loosening or cutting through of the sutures.

Wyss has made a small collection of these cases. Sheffzek reports two post mortems after Cæsarean section in which the catgut sutures had become completely unknotted. Boissard reports the case of a patient who died from sepsis on the fifth day; four of the interrupted catgut sutures had become untied and the incision gaped widely; there was intraperitoneal hæmorrhage, and the uterine cavity was filled with blood clot. Cristalli reports a case where, because of severe and persistent hæmorrhage following Cæsarean section, the abdomen was reopened; a gap was found in the uterine incision, which had been sutured with silk. One is led to believe that this accident may sometimes happen in cases that recover; they would not necessarily pass through a stormy convalescence, for such an accident, without sepsis or with only local sepsis, should not produce much disturbance. The partially or completely gaping scar would quickly be sealed or plugged by omentum. It is quite probable that the firm adhesion of omentum to the old scar, so commonly found in cases of repeated Cæsarean section or subsequent rupture, may represent the same protective plug.

### *Utero-abdominal Fistula.*

This is not a great rarity, following infection of the uterine and abdominal wounds, and may persist for many months; the uterine scar in such cases is bound to be extremely defective and liable to rupture in subsequent pregnancy. Amongst the reported cases of ruptured scar, utero-abdominal fistulæ had followed the Cæsarean section in five.

If accompanying the fistula the uterine scar is completely adherent to the abdominal wall, subsequent rupture may be entirely extraperitoneal. An interesting example of this is recorded by Noble (not placed amongst the list of ruptured scars). A utero-abdominal fistula persisted after the first Cæsarean section; another pregnancy soon followed and the liquor amnii escaped through the fistula in the thirty-third week. The second Cæsarean section was performed by enlarging the fistulous opening; the uterine scar was found completely adherent to the abdominal wall, and the operation was entirely extraperitoneal.

### *The Site of the Uterine Incision and Subsequent Rupture.*

On referring to the summary of reported cases it will be noted that, in the 85 cases where the site of incision was stated, the anterior median incision was employed 55 times, the transverse fundal 28 times, and the cervical only once. There is no doubt that the transverse fundal incision, introduced by Fritch in 1897, is specially liable to rupture. The number of ruptures after this incision, compared with the number after the anterior median, is relatively very high, considering how late it was introduced, and how relatively few must be the number of Cæsarean sections in which this incision was employed. A point which theoretically favours rupture of transverse fundal scars is that most of the muscle bundles are cut at right angles, and the incision therefore tends to gape widely, favouring imperfect union.

The incision that at present holds the best record for immunity from rupture is the cervical (by this I mean the transperitoneal or extraperitoneal cervical operations, of which, as is well known, there are many varieties). All the same, before this incision is lauded because of its apparent immunity from rupture it must be remembered that very few cervical Cæsarean sections have, up to now, been performed, compared to the thousands of classical and transverse fundal Cæsarean sections; it still has to stand the test of time.

The cervical incision was first employed by Frank in 1906. It was at once pointed out by the theorists that the cervical scar would be specially prone to rupture; it lay in that part of the uterus most subjected to stretching during labour, and, being placed nearer the contaminated area (i.e., the vulvo-vaginal tract), would therefore be more liable to infection. These fears have not been fulfilled; only one case of rupture has been reported, by Wolff in 1914, and only a small number of thin cervical scars have been observed, in spite of the fact that many cases of subsequent pregnancy have occurred. There seem to be excellent reasons for the sound healing of cervical scars. Rest is an essential to good union of divided muscles; a state of rest or immobility is impossible in the body of the puerperal uterus, where contractions and relaxations are constantly tending to disturb the apposed surfaces and draw the healing muscle fibres apart. All operators are aware of the great lateral tension on the sutures and of the tendency of the incision to gape during a strong contraction. On the other hand, the cervical incision is situated in a quiet part of the uterus which does not undergo contractions and relaxations. In Frank's original operation he incised the cervix transversely; this has now been generally replaced by a longitudinal incision. The stretching and rupture of the transverse scar would seem more likely because its line lies at right angles to the direction of the chief pull of the uterine muscle fibres; whereas the longitudinal scar lies in the line of the pull, and its edges have scarcely any tendency to be drawn apart.

### *Influence of Implantation of the Placenta over the Scar.*

The relation of the placenta to the scar at the time of rupture was noted in 51 out of the 97 cases; in 34 cases it was implanted over the scar, and in 17 it was not. From this it may be assumed that the implantation of the placenta has at all events a share in predisposing the scar to rupture, but far too great importance has in the past been attached to this point. That the placenta cannot be the direct cause of rupture is obvious enough, for, on the one hand, the placenta is very often not over the scar in cases of rupture, and, on the other, in cases of repeated Cæsarean section it is often found over the scar without any harmful effect.

The idea that implantation of the placenta over the scar was the cause of rupture came very early into the field. It was known that rupture of the pregnant tube was caused by the eroding action of the villi, and that in certain cases of placenta prævia the lower uterine segment was appreciably weakened and more liable to traumatic rupture. An analogy between these two and scar rupture was tempting; but there is no histological evidence to show that chorionic villi invade scar tissue any more than they do normal uterine

tissue. It has also been suggested that when at the original Cæsarean section the incision is over the placental site perfect healing is interfered with; there is no histological evidence for this. Amongst the 97 cases of ruptured scar the relation of the incision to the placental site at the original Cæsarean section is only mentioned in 16 cases, in 10 of which the incision was over the placental site. Nothing can be inferred from these figures; it must be remembered that when the operator encounters the placenta in his incision he may state the fact in his records, but that he is much less likely to state the negative fact.

I believe the reason why implantation of the placenta over a thin scar increases its liability to rupture is the occurrence of retroplacenta hæmorrhage. The first step towards this is a gradual yielding and widening of the scar area; there follows a very gradual, and probably very slight, separation of the placenta over and adjacent to the scar area. The mechanism of this separation is comparable to the separation of a placenta prævia from the lower uterine segment when the cervix begins to dilate. Hæmorrhage between the scar area and the placenta will bring about a sudden rise of pressure sufficient to precipitate rupture. In my own case 2 there was beneath the peritoneal scar area a well-defined subperitoneal hæmatoma, which had extended laterally, stripping the peritoneum off the uterine wall; I do not think this occurred entirely after the event. In a case of ruptured scar reported by Wing there was a well-defined blood clot on the maternal surface of the placenta, and there can hardly be any doubt that hæmorrhage between the scar area and the placenta was the direct cause of the rupture.

*Effect of Sepsis on the Healing of the Uterine Wound.*

Of all the causes of imperfectly healed scars sepsis is by far the most important. Reference to the summary shows that fever or sepsis during recovery from the Cæsarean section was noted in 51 out of 66 cases; in only 15 of the 66 was the recovery afebrile. It is obvious that infection and suppuration of the uterine incision must of necessity be followed by imperfect healing.

If the septic process be severe the uterine tissues included between the sutures will undergo necrosis; the sutures will cut out, the muscular walls will retract, and the end result will be a scar which consists of little more than peritoneum with a protective layer of omentum or other adhesions. Even if the sutures do not cut out, the wound will have to pass through a stage of granulation tissue, and will result in a broad, fibrous scar. If silk be employed, the suppurative process will continue until the silk sutures have come away; cases have been recorded in which silk sutures were found in the uterine discharges. In the two cases recorded by Wyss, in one silk stitch sinuses persisted for many months; and in the other, after a persistence of stitch sinuses, the linen thread sutures were removed from the interior of the uterus by curetting. If catgut be employed, its absorption will be hastened by sepsis. The point will be raised that in 15 cases of rupture there was no evidence of sepsis in that the convalescence was afebrile. But infection of the uterine wound may occur without rise of temperature, or with only a very slight one; for example, few will deny that the presence of extensive adhesions to the scar at a subsequent operation is evidence of sepsis during the healing process, and there must be many operators who have found these adhesions when the temperature chart of the original Cæsarean section did not betray sepsis. For example, at a second operation I found such extensive adhesions of the great omentum to the abdominal wall and to the uterine incision, accompanied by such a number of enormously distended blood-vessels, that I had to eventrate the uterus and incise its posterior wall; palpation of the old scar showed that it was extremely thin in places, and formed a series of deep pits on the inner surface of the uterus. After the first operation the temperature had been charted every two hours during the first five days; on the second day the highest record was 99·6° F., on the third 99°, on the fourth 98°, on the fifth 98·4°. During the following days the only records above normal were 99·2° on the ninth day, 99·8° on the eleventh, and 99·6° on the fourteenth. The abdominal wound healed by primary union, and the patient made an exceptionally smooth convalescence. Silk was employed to suture the uterus. Here there had clearly been infection of the uterine wound, and yet the temperature chart did not betray it. The point is, that although the temperature chart may be a smooth one, infection of the uterine wound may occur sufficient to impair healing. I believe that the operation of Cæsarean section can never be guaranteed as a surgically clean one, for there is a large wound in a mucous cavity in direct communication with, and within a short distance of, a contaminated area (the vulvo-vaginal tract). It is sufficiently well known that hæmolytic streptococci have frequently been found in the normal puerperium, not only in the vagina, but also in the apparently healthy uterus. I have been surprised by the large number of Cæsarean section cases in which the recovery was febrile; in the London Hospital and City of London Maternity Hospital series of 84 cases recovery was afebrile in only 38, or 45 per cent. (trivial rise of temperature in first 48 hours of course not counted).

A study of the type of convalescence from a Cæsarean section is of the utmost importance in arriving at a decision as to the management of future pregnancies.

If the convalescence has been febrile and there has been other evidence of sepsis the scar is probably thin and there is risk of rupture. If, on the other hand, convalescence has been afebrile the chance of rupture is a very small one, but it is quite plain that there is no absolute guarantee against rupture, since an appreciable number of cases of rupture have been reported even after an afebrile convalescence. On the other hand, it can be shown that patients whose convalescence has been accompanied by even considerable fever can successfully deliver themselves on a future occasion by the natural passages.

*Suture Material and Method of Suture.*

In all the cases under review except one the entire thickness of the uterine wall was sutured either by introducing buried layers, or by using deep sutures which passed through the whole thickness of the uterine wall except the endometrium. There is no need to dwell upon this point, as it may be taken for granted that all modern operators take good care to unite the whole thickness of the uterine wall.

Great controversy has waged about the best suture material for closing the uterine incision. On looking at the table it will be noted that, out of the 53 cases in which the suture material used for the deep sutures is mentioned, catgut was employed in 41 and silk in 12; in most of the cases in which silk was used there was also a superficial peritoneal suture burying the knots of the deep layer. It would be false reasoning to conclude from these figures that rupture is more liable to occur after catgut than after silk. Before it is justifiable to come to such a conclusion it would be necessary to know the relative frequency with which silk and catgut were employed. In Great Britain, up to the year 1910, Dr. Amand Routh's book tells us (p. 23) that, of the 81 operators who sent him particulars, 41 used silk for the deep sutures, 27 catgut, 8 silkworm gut, and 4 linen thread. Since the date of this inquiry, amongst those surgeons who have sent me particulars of their cases for the period under investigation (1912–1918) the use of catgut is far more customary than that of silk. (See Table I.) From reading modern text-books and monographs by American and German authors it is apparent that catgut is almost universally used in those countries; in France silk is still preferred. There seems to be no doubt that catgut has been in the past, and still is, far more commonly employed than silk. It is not justifiable therefore to conclude from the figures relating to the use of catgut and silk respectively, in cases of ruptured scar, that catgut is more blameworthy than silk.

The suture material can, of course, only be of importance during the process of healing, and so long as a slowly absorbable preparation of catgut, such as chromic, is used, capable of resisting absorption for at least three weeks, there can be no objection to its use so long as the wound is healing aseptically. A point that has been emphasised is that in the involuting uterus the intracellular enzyme activity is considerably raised, and that therefore a protein material, such as catgut, would be absorbed more quickly than in other tissues; this point is a sound one, and is sufficient reason for not employing plain catgut, which is quickly absorbable. If the uterine incision becomes infected the process of healing is, of course, considerably delayed, and the absorption of catgut hastened; for this reason I think catgut has serious disadvantages. In the case of an infected wound, whose muscular edges are constantly tending to be drawn apart by the retractile power of the muscle, it is important that the edges should be kept in apposition for as long as possible. Here catgut fails, and a less absorbable material is far preferable. Since it is, in my opinion, impossible to guarantee aseptic healing of the uterine incision, I believe that catgut should be avoided. (See also Part 3 for the conclusion arrived at as the result of the collective investigation.)

Considering now the two types of non-absorbable suture, we have to consider silk or linen thread and silkworm gut.

Theoretically, silkworm gut is far the more preferable; it is well known that if infection occurs silk sutures encourage the process of suppuration, which goes on almost indefinitely, and seldom ceases before the sutures have come away

naturally or have been removed. Silk in an infected wound is an irritant and an inveterate harbourer of bacteria. On the other hand, silkworm gut is an inert material in the presence of bacteria, and has little or no influence in prolonging the suppurating process. My own opinion is strongly in favour of the use of silkworm gut for the deep uterine sutures, firstly, because it is a non-absorbable material and will hold the sides of the uterine incision in place for an indefinite period of time, unless, of course, it cuts out owing to an extensive necrosis of the tissues; secondly, because it is an inert material in the presence of bacteria. It is interesting to note that no case of ruptured scar has been reported in which silkworm gut was used; it would be wrong, of course, from this to jump to a too obvious conclusion, for silkworm gut has been relatively very seldom employed.

Another point I consider of great importance in suturing is to wait for complete retraction before inserting the sutures; if the wound is sutured before retraction is complete and the muscular walls are thin the result is bound to be a scar thinner than the rest of the uterine wall, for the sutures fail to include layers of muscle fibres which during complete retraction would have slid inwards and become rearranged, adding to the thickness of the sides of the incision.

### *Accidental Factors in Causation of Rupture.*

Any circumstance in pregnancy or labour which is likely to strain the scar to an exceptional degree may precipitate rupture in a case in which, under ordinary circumstances, the scar, though a weak one, might have remained intact.

Such circumstances in pregnancy are the over-distension of the uterus by hydramnios, excessive size of the fœtus or twins, a large retroplacental hæmorrhage, or the introduction of a hydrostatic bag; in labour, prolonged or obstructed labour, internal version, or the use of pituitary extract. It will be noted that such accidental factors are recorded in only 17 of the 97 cases. A study of these cases points the moral that patients who bear Cæsarean section scars should not be allowed long labours, and that the employment of version, bags, or ecbolic drugs is to be avoided.

### *Some Clinical Points.*

Parity, interval between the Cæsarean section and rupture, number of Cæsarean sections preceding rupture, treatment, and result to mother and child require no further comment here. The bare facts are sufficient, and will be found in the summary of cases. Other points deserve closer consideration.

*Labours intervening between Cæsarean section and rupture.*—In eight cases one delivery by the natural passages occurred between the two events. Why did the uterus stand the stress of one pregnancy and labour only to yield to it in the next? We naturally turn to inquire whether any additional stress had been put on the scar beyond that of the normal state. In four of these we find unusual circumstances: in one the labour lasted 20 hours and the pelvis was contracted; in one the placenta was implanted over the scar; in one delivery was by internal version; and in one labour was induced by a hydrostatic bag for toxæmia of pregnancy. In the other four there was no abnormality of pregnancy or labour; it is unwise, therefore, to indulge in any false sense of security merely because a patient has already delivered herself by the natural passages.

*Period of pregnancy at which rupture occurred.*—In 70 out of the 87 cases in which the period is stated the scar ruptured at full term or within a month of it. In a case reported by Hermann either the scar had ruptured at a very early period of pregnancy or, what is much more likely, the original Cæsarean section incision had always remained open from imperfect healing and was sealed by adhesions only; the ovum had developed partly in the uterus and partly in the abdominal cavity. The fœtus lay in an intraperitoneal gestation sac—a case of secondary abdominal pregnancy. In one case (Richter) a partial rupture occurred in the fourth month, which was completed at the seventh. Of the cases where rupture occurred in the seventh month (see summary) in only two was there any explanation for such early rupture; in one a bag was inserted for placenta prævia, and in the other the placenta was implanted over the scar. Circumstances which should favour early rupture are implantation of the placenta over the scar and retroplacental hæmorrhage, hydramnios, and operative manipulation; also excessive thinness of the scar, especially where there are gaps in the line of the scar merely closed by omental adhesions.

*Moment of rupture, during pregnancy or during labour.*—It will be observed from the summary that in the 84 cases in which this point is stated rupture occurred during labour in 48 and before the onset of labour in 36. Of the former rupture occurred early in the first stage in 29. This aspect of the subject is plain enough; a scar is much more strained during uterine contractions than during the quiescent period of pregnancy, and if labour be allowed to continue for a long time, especially if obstructed, the scar is subjected to an unwarrantable strain. A point worth bearing in mind is that for many patients who go into labour subsequently to a Cæsarean section the labour is for all intents and purposes a primiparous one; a patient who has had labours previous to the operation is less likely to strain her scar and get a rupture than a patient whose operation was done when she was a primigravida. Other circumstances which obviously favour rupture during pregnancy are over-distension of the uterus and implantation of the placenta over the scar with retroplacental hæmorrhage; only a few examples of such will be found amongst the 36 reported cases, and it must be assumed that thin scars often yield under the influence of the normal intra-uterine pressure. The possibility of rupture of the scar during pregnancy and as early as the seventh month is a very sinister feature of the accident. It makes it difficult for us, however forewarned by our knowledge of the risk run by the patient, to protect her completely from the consequences; we cannot very well keep her under close observation in a hospital or nursing home from the seventh month onwards, ready to operate at the first sign or symptom.

*Cases with absence of, or with very slight, symptoms.*—All are familiar with the usual signs of rupture of the uterus: sudden pain, collapse, signs of intraperitoneal bleeding, cessation of labour pains, and the distinctive feeling of the fœtus and retracted uterus. The point about these cases of ruptured scar is that the signs and symptoms are often extremely slight and are not seldom absent altogether. The explanation is not far to seek; instead of the whole thickness of the uterine wall being torn through, only a membranous and avascular scar has yielded; instead of sudden rupture being determined by powerful and prolonged uterine action in an exhausted patient, the rupture often occurs quietly and gradually during pregnancy or the early stage of labour. The membranous scar yields at one point, a small bag of membrane bulges through, and the patient goes into labour, as it were, through a gradually yielding scar until the ovum is born into the peritoneal cavity. The severity of the symptoms is naturally dependent on the position of the placenta. If the placenta is implanted over the scar, hæmorrhage is likely to be very severe; if the placenta is well away from the scar, it separates and is expelled into the peritoneal cavity with very little more hæmorrhage than occurs after a normal third stage of labour. In cases where the rupture is partial and the ovum is still in the uterus acute symptoms are obviously not to be expected. In some cases a partial rupture, sometimes only a small perforation, has been quite unexpectedly discovered at a repeated Cæsarean section. If the placenta is over the scar, even a small perforation may be accompanied by considerable intraperitoneal hæmorrhage. Apart from the type of rupture—i.e., whether complete or a mere perforation—in 6 of the reported cases symptoms were entirely absent and in 14 they were extremely slight. Three cases of complete rupture, accompanied by escape of the fœtus and placenta into the peritoneal cavity, with extremely slight and misleading symptoms, may be quoted as examples. In Munro Kerr's case the absence of symptoms caused a mistake in diagnosis; there was no collapse, only a slight alteration in pulse-rate, and slight abdominal pain and tenderness. In Breitstein's case the only symptoms were slight pain and a feeling of weight in the lower abdomen, worse on standing. In Novak's case there was no intraperitoneal hæmorrhage or shock; there was diffuse abdominal pain for a few days, after which the patient was comparatively comfortable, walking about with little inconvenience.

### *The Frequency of Rupture.*

Upon this all-important point we possess, up to the present, no reliable information.

Harrar, reviewing the records of 50 repeated operations at the New York Lying-in Hospital, found two partial and two complete ruptures of the scar. Spalding states that of 40 patients who had Cæsarean sections in his clinic or in his private practice, only one patient, to his knowledge, had had spontaneous labour later. This patient, after one spontaneous labour, got rupture of the scar in her next pregnancy. Jolly refers to his case as the third during the last 30 years at Olshausen's Clinic. Asa B. Davis states he had had only 9 ruptured scars out of the 360 Cæsarean sections he had done (? personally). These figures, interesting as they may be, throw no light whatever on the actual frequency of ruptured Cæsarean section scars.

The only way of arriving at the truth is to get the subsequent obstetric history of a large number of Cæsarean section patients, and this forms the subject of Part 3.

### 3. Results of a Follow-up Inquiry.

This section deals with the results of a follow-up inquiry into the subsequent history of a series of Cæsarean section patients operated on between 1912 and 1918. I was, of course, concerned about the five cases of rupture at the London Hospital, and was anxious to find out what proportion these cases bore to the number of our Cæsarean section patients who subsequently became pregnant. This meant a follow-up inquiry. The difficulty was to decide how far back to go in selecting a year for the beginning of the period of inquiry. It was useless to go too far back, as there would be a small chance of getting hold of patients who had their operation at too remote a date in a class that changes its abode so often. I decided on the period 1912 to 1918. The results of this inquiry would give the frequency of ruptures at the London Hospital, but it would not give a reliable figure for the percentage of ruptures in general, for the London Hospital cases were only a small sample selected from the mass of cases throughout the country. Further, it was a special sample, in that it contained, without a shadow of doubt, a high proportion of cases of ruptured scar. A much larger and more mixed sample was necessary. So, to begin with, I decided to add to the London Hospital cases the cases from the City of London Maternity Hospital, taken over the same period; in the latter hospital there had been no case of ruptured scar.

These combined figures work out as follows:—

| | |
|---|---|
| Total number of Cæsarean sections (excluding fatal cases, sterilised cases, and cases of repeated Cæsarean section where the first operation was performed prior to 1912) ... ... | 112 |
| Number of patients who were followed up ... ... ... ... ... ... | 84 |
| Number in whom no subsequent pregnancy occurred ... ... ... | 49 |
| Number who subsequently became pregnant ... ... ... ... ... | 35 |

Results of pregnancies:

| | | | |
|---|---|---|---|
| Delivery by natural passages | 10 | Pregnant now ... ... ... ... | 4 |
| Repeated Cæsarean section | 15 | Rupture of the scar ... ... | 5 |
| Abortion ... ... ... ... ... | 5 | | |

These depressing figures show that 5 pregnancies out of 30 (i.e., after deducting abortions and patients in the early months of pregnancy), or 16 per cent., resulted in rupture of the scar, and that there were half as many ruptures as deliveries by the natural passages. They further show an unexpected degree of sterility following the operation.

Leaving now the main line of argument for a moment, I will refer to an objection which can be raised against these figures; it is that the follow-up failed in 25 per cent. of the patients, and that some of these patients may have become pregnant and may have got ruptured scars, or have had spontaneous deliveries, or what not. My own conviction is that these patients either did not become pregnant or had early abortions. If they had been expecting confinements they would almost certainly have sought the advice of their hospital, except in the few cases where they had left London. If all patients had been successfully followed up the only result would have been the recording of a still higher percentage of sterility.

To return to the main argument, it was essential to take a much larger sample of cases than that taken from the London and City of London Maternity Hospitals if the figures were to be statistically reliable. As it seemed of such immense importance to get at the truth, I decided to try and get the results of Cæsarean sections done throughout the country during the same period. I therefore wrote to many obstetric surgeons in active hospital practice, asking them to collaborate with me in a collective investigation. This investigation has been a complete success, in that we are in possession of the subsequent obstetric history of 1103 cases of Cæsarean section (including the London Hospital and City of London Maternity Hospital cases already referred to) performed between the years 1912 and 1918 inclusive.

*Result of the Collective Investigation.*

In Table I. are displayed the number of cases and their sources, together with the number followed up, the number that subsequently became pregnant, and the mode of termination of the pregnancies. The suture material, as used in the total number of Cæsarean sections, is also shown.

The table may be summarised as follows:—

| | |
|---|---|
| Total number of Cæsarean section patients (excluding fatal and sterilised cases, and cases of repeated Cæsarean section where the first operation was performed prior to 1912) ... ... | 1605 |
| Number followed up ... ... ... ... ... ... ... ... ... ... ... | 1103 |
| Number in whom no subsequent pregnancy occurred... ... ... | 616 |
| Number who subsequently became pregnant ... ... ... ... ... | 487 |

Results of pregnancies:

| | | | |
|---|---|---|---|
| Delivered by natural passages ... ... ... ... | 78 | Abortion ... ... ... ... ... | 47 |
| Repeated Cæsarean section | 352 | Pregnant now ... ... ... | 86 |
| | | Rupture of scar ... ... ... | 18 |

The discrepancy between the number of pregnancies and the number of patients who became pregnant is, of course, accounted for by the fact that some patients became pregnant more than once.

TABLE I.

| — | Total patients. | Number followed up. | No subs. preg. | Subs. preg. | Results of pregnancies. | | | | | Sutured with— | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Del. nat. pass. | Rep. Cæs. sec. | Abort. | Preg. now. | Rup. of scar. | Cg. | Sk. | Sw.g. |
| St. Mary's, Manchester ... ... | 243 | 190 | 96 | 94 | 4 | 79 | 13 | 21 | 1 | 188 | 1 | 0 |
| Q. Charlotte's Hosp... ... ... | 175 | 88 | 49 | 39 | 8 | 24 | 5 | 7 | 0 | 3 | 70 | 8 |
| Glasgow R.M. & W.H. ... ... | 143 | 82 | 40 | 42 | 5 | 31 | 5 | 4 | 1 | 36 | 31 | 0 |
| Liverpool Mat. Hosp.... ... ... | 142 | 83 | 30 | 53 | 8 | 38 | 2 | 12 | 3 | 82 | 0 | 0 |
| Jessop Hosp. ... | 128 | 105 | 64 | 41 | 8 | 37 | 3 | 2 | 4 | 84 | 30 | 0 |
| Leeds Mat. Hosp. | 93 | 63 | 35 | 28 | 2 | 30 | 2 | 6 | 1 | 63 | 0 | 0 |
| London Hosp. | 65 | 52 | 29 | 23 | 5 | 12 | 2 | 2 | 5 | 25 | 22 | 5 |
| St. Bart.'s Hosp. | 59 | 22 | 10 | 12 | 5 | 11 | 0 | 1 | 0 | 0 | 0 | 25 |
| Guy's Hosp. ... | 57 | 45 | 18 | 27 | 7 | 13 | 3 | 6 | 0 | 40 | 0 | 0 |
| Middlesex Hosp. | 56 | 36 | 22 | 14 | 4 | 10 | 3 | 2 | 1 | 21 | 14 | 0 |
| Mr. F. Jordan | 50 | 43 | 29 | 14 | 0 | 7 | 0 | 8 | 0 | 43 | 0 | 0 |
| City of London M.H. ... ... ... | 47 | 32 | 20 | 12 | 5 | 3 | 3 | 2 | 0 | 1 | 27 | 4 |
| Edinburgh ... | 46 | 38 | 27 | 11 | 1 | 8 | 0 | 3 | 0 | 12 | 27 | 0 |
| Gen. L.-I. H., York-rd. ... ... | 46 | 28 | 20 | 8 | 0 | 7 | 0 | 2 | 0 | 3 | 15 | 7 |
| St. Thomas's Hosp.... ... ... | 44 | 27 | 15 | 12 | 4 | 7 | 1 | 2 | 1 | 17 | 10 | 0 |
| Leeds Gen. Infirm. ... ... | 41 | 38 | 22 | 16 | 5 | 12 | 1 | 3 | 0 | 38 | — | — |
| Rotunda Hosp. | 40 | 28 | 14 | 14 | 4 | 6 | 0 | 5 | 1 | 2 | 27 | 0 |
| Mr. F. Edge ... | 36 | 25 | 15 | 10 | 1 | 7 | 1 | 1 | 0 | 25 | 0 | 0 |
| Dr. B. Whitehouse ... ... | 30 | 20 | 13 | 7 | 0 | 3 | 3 | 2 | 0 | 20 | 0 | 0 |
| St. George's Hosp. ... ... | 16 | 14 | 13 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 14 |
| Mr. C. Martin | 15 | 15 | 13 | 2 | 0 | 2 | 0 | 0 | 0 | 12 | 3 | 0 |
| Westminster Hosp.... ... ... | 11 | 11 | 9 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 11 | 0 |
| Dr. B. Solomons | 8 | 5 | 4 | 1 | 0 | 1 | 0 | 0 | 0 | 5 | 0 | 0 |
| Mr. Darwall Smith (private) | 7 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| Womens' Hosp., Birmingham ... | 7 | 6 | 2 | 4 | 2 | 2 | 0 | 0 | 0 | 6 | 0 | 0 |
| Total ... ... | 1605 | 1103 | 616 | 487 | 78 | 352 | 47 | 86 | 18 | 731 | 288 | 70 |

A good many interesting points could be worked out from the lists of cases I have had sent me; for example, the sterility rate that follows Cæsarean section. But here I intend only to work out two—viz., the frequency of rupture and the suture material. (The publication in full of the lists of cases will give anyone who so wishes the opportunity of working out other points, or for checking my own results.)

*The Frequency of Rupture.*

Out of the 487 patients who became pregnant 18 (or 3·6 per cent.) got ruptured scars. This figure does not represent the true frequency of rupture; it is necessary to know the frequency of rupture amongst the pregnancies that went to, or near to, term and were therefore liable to get ruptured scars. Adding together the repeated Cæsarean sections, the deliveries by the natural passages and the ruptured scars, we find they come to 448. The true frequency of rupture is 18 in 448, or 4 per cent. It is also interesting to note that the proportion of ruptured scars to successful deliveries by the natural passages is 18 to 74, or 1 to 4·3.

*The Suture Material.*

Out of 1089 Cæsarean sections in which the suture material is noted (see Table I.), in 731 catgut was used, in 288 silk, and in 70 silkworm gut. The frequency with

which these suture materials was used in general works out at 67 per cent. catgut, 26 per cent. silk, and 6 per cent. silkworm gut (incidence of catgut to silk equals 1 in 2½).

In the cases of ruptured scar catgut was used in 15 cases, silk in two, and in one case there is no record of the suture material. In no case was silkworm gut used. The frequency with which the suture materials was used in cases of ruptured scar works out at 88 per cent. catgut, 12 per cent. silk, 0 per cent. silkworm gut (incidence of catgut to silk equals 1 to 7). The number of silkworm gut cases is, of course, too small to draw conclusions from. It is thus apparent that the incidence of catgut to silk in cases of ruptured scar is nearly three times its incidence in Cæsarean section in general. From this it might be inferred that scars are nearly three times as liable to rupture after the use of catgut as after the use of silk.

But to this conclusion a reasonable objection may be raised. It may be urged that perhaps very few cases of pregnancy followed the use of silk compared to the number that followed catgut.

For example, if only 10 or 20 cases of advanced pregnancy or labour occurred amongst the silk cases silk would come badly out of the ordeal, with two ruptures to its credit. This objection can quite easily be met and overcome. It is necessary to find out the proportion of ruptures to advanced pregnancies amongst the silk cases and compare it to the proportion of ruptures to advanced pregnancies amongst the catgut cases. This information is set out in Table II. :—

TABLE II.

| — | Repeated Cæs. sect. | Delivery by nat. pass. | Rupture. | Total. |
|---|---|---|---|---|
| Catgut ... ... | 237 | 49 | 15 | 301 |
| Silk... ... ... | 72 | 19 | 2 | 93 |
| Silkworm gut | 15 | 6 | 0 | 21 |

This shows that 15 ruptures occurred in 301 cases of advanced pregnancy (i.e., repeated Cæsarean section, plus delivery by the natural passages plus rupture) after the use of catgut, a proportion of 1 in 20; and that two ruptures occurred in 91 cases after the use of silk, a proportion of 1 in 46·5. That is about 2 per cent. of the silk cases, and 5 per cent. of the catgut cases were followed by rupture in subsequent pregnancy.

The liability to rupture after catgut is, therefore, nearly two and a half times the liability after silk. Put in another way, if silk had been used instead of catgut in the above 301 catgut cases, and ruptures had occurred in the same proportion as for the silk cases, there would have been only six ruptures instead of 15, and the total number of ruptures for all cases would have been reduced from 17 to 8.

From the facts revealed by these figures there can be no doubt that catgut is a dangerous suture material for Cæsarean section, and henceforth should be discarded.

### CONCLUSIONS.

(1) The frequency of rupture of the Cæsarean section scar in subsequent pregnancy or labour (abortions excluded) is 4 per cent.

(2) The cause of ruptured scar is imperfect healing, leading to a thin scar in which muscular union has failed, and which consists of little more than peritoneum and decidua with a varying amount of intervening fibrous tissue.

(3) All thin scars stretch during pregnancy; rupture of a thin scar may be determined solely by the intrauterine tension of normal pregnancy or by the uterine contractions of normal labour; or it may be favoured by various accidental factors, of which the chief is insertion of the placenta over the scar, with partial separation of the placenta, and retroplacental hæmorrhage.

(4) Other accidental factors are over-distension of the uterus, prolonged or obstructed labour, operative interference, such as internal version, the insertion of hydrostatic bags, and the administration of such drugs as pituitrin.

(5) In the reported cases rupture occurred almost as often during pregnancy as during labour (in proportion of three to four); and many cases have been reported as early as the seventh month of pregnancy.

(6) The chief cause of imperfect healing is infection of the uterine wound; other causes are imperfect methods of suture and the employment of unsuitable suture material.

(7) As regards the suture material, catgut should not be used, for the liability to rupture after catgut is two and a half times the liability after silk. For theoretical reasons silkworm gut is the most suitable material.

(8) As regards the incision, the scar of the transverse fundal incision is especially liable to rupture. Only one case has so far been reported of rupture of the scar of the cervical incision.

I wish to tender my most sincere thanks to my fellow obstetric surgeons in the British Isles who have so generously responded to my call for a collective investigation. The collection of these lists has occasioned an immense amount of careful work to those who have undertaken the task. It is the utmost gratification to me, as I am sure it is to them, that our work has met with success and has revealed so many outstanding facts about a subject of such great importance to us all.

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# Clinical Notes:

## MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

### A CASE OF

### TRAUMATIC DISPLACEMENT OF LUMBAR VERTEBRA:

#### RECTIFICATION AFTER TWELVE YEARS.

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THE following case indicates the value of X ray examination in cases of obscure backaches before resort to manipulative treatment. Treatment can then be rationally directed to the lesion at fault, and valuable time saved.

*History.*—H.E., 28 years old, fell down eight or nine stone steps during Easter, 1908. She was able to get up unassisted and to walk, but felt great pain in the lower lumbar and sacral region, particularly in attempting to stoop or lift anything. She stayed in bed for 36 hours and was unable to turn herself, or even half sit up. She then returned to her nursing duties, but although the back pain was bearable it was persistent and only gradually began to settle down. The stiffness and pain—which have been more or less present ever since—was particularly pronounced during 1909, when it made itself felt in several acute attacks of a severe nature. Treatment by heat and massage only gave temporary relief. The condition became worse in the latter half of 1918, when the trouble seemed to spread

to the upper part of the back. At the end of that year the neck and shoulders also began to be stiff and painful—chiefly on the right side. There was aching when sitting down, even for a short time, and difficulty in standing upright. The general condition naturally suffered by the continuous aching, and frequent spells of sick leave were needed. The back, however, did not improve, but went from bad to worse during the end of 1919.

*Examination, Feb., 1920.*—There were great tenderness and irritability of the lumbar muscles, chiefly on the right side. In standing the left shoulder was held higher than the right, the whole body tending to lean towards this side. The hips were level. When stooping, which was accompanied by great pain and which could not be done as far as the horizontal plane, there was marked deviation of the trunk to the right in a manner which is never seen in cases of lateral curvature of the spine, not even of the severest type. This deviation was also present when lying down. In fact, the greatest difficulty was encountered in trying to put the patient in a straight position. When standing, side-bending of the trunk to the right was comparatively easy, but almost impossible to the left. There were also stiffness and pain in the cervical region.

*X ray examination.*—A X ray plate of the back (Fig. 1), which had been taken by the recommendation of Dr. H. C. Cameron on Jan. 1st, showed a local bend of the spinal column between the third and fourth lumbar vertebræ in a manner which I think can only be explained by forcible locking between the articular processes of these vertebræ, which presumably happened at the accident 12 years ago. The lower articular process of the third vertebra has a relation to the fourth articular process, which could scarcely by itself be brought about in a normal side-bending motion.

The malposition of the third lumbar vertebra, in addition to an associated irritation and contraction of the erector spinæ muscle, sufficiently explained both the general stiffness and the lateral deviation of the back.

*Treatment.*—Manipulative treatment began on Jan. 15th in the form of mobilising movements, partly general for the spine and partly directly aiming at freeing the abnormal adherence between the third and fourth lumbar vertebræ. In addition, general back massage was given for easing the pain and rendering the muscles more supple. The result was complete correction of the faulty position, confirmed by an X ray plate taken on March 3rd, which shows a completely straight spine. The correction was probably

FIG. 1.—Radiogram of the lumbar spine of H. E. before rectification. The upper arrow indicates the interval between L. 3 and L. 4, the inclination here (obtained by measuring the angle between the lines, joining the tips of the transverse processes) being 6·5°, and that between L. 4 and L. 5 practically nil. The lower arrow indicates the unusual relation of the articular processes.

gradual at first, judging from the steady improvement in executing the stooping exercises, which were done with less and less deviation from Jan. 19th. On Feb. 20th, however, while passively stretching the spine, a distinct "snap" was heard by both patient and operator, the former also having a "sensation of something slipping into a different position" in the lumbar region; this, in all probability, meant that the vertebræ were finally unlocked. After this occurrence there was a sensation of relief and greater freedom of movement in the back, and soon after the bending-down movement from a standing position with straight knees could be done to normal range, with fingers easily touching the floor and without any lateral deviation. The nocturnal rest, which had previously been much disturbed—probably from difficulty in getting into a comfortable position—improved greatly.

*Comment.*

To verify the fact that the original malposition of the third lumbar vertebra was traumatic and not merely postural, and in view of the fact that other arthritic changes in the vertebral articulations were present, an X ray plate was taken (Fig. 2) of a normal spine, in a position of side flexion. The subject, a female, aged 35, lying prone, was instructed to bend herself over to the right side as far as she could. The figure confirms the fact that the lumbar spine permits of a considerable amount of side flexion, and it is interesting to note how evenly distributed the bending is along all the lumbar vertebræ without any exaggerated approximation between any special two of them. Mr. J. M. Redding—to whom I am indebted for the X ray plates—stated in his report

FIG. 2.—Radiogram of the lumbar spine in a normal subject (female, aged 35) lying prone, with the maximum active lateral bend. The inclination between L. 2, L. 3, L. 4, and L. 5 is 7°, 8°, and 6° respectively.

of Jan. 7th that "there are fairly well-marked osteo-arthritic changes in both knees and fairly advanced osteo-arthritis of lumbar spine at junction of fourth and fifth vertebræ." It would be interesting to know if this condition is a separate one, or whether it is secondary and dependent upon the malposition of the vertebræ, giving rise to trophic changes from pressure irritation of nerves.

Patient now states there is less pain, apart from movement. She can now stand and lie straight, rests better in bed, and appetite and sleep improved.

I wish to express my gratitude to Dr. Cameron for permission to publish this case.

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A CASE OF

## IDIOPATHIC ATONY OF THE BLADDER.

BY S. M. VASSALO, M.D.,

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THE following case of atony of the bladder is of interest, not so much from the clinical as from the pathological point of view.

W., native male, aged about 50. Was admitted into hospital on Feb. 12th. Patient was in great pain and complained that he had not passed water for a fortnight. On examination there was a marked median abdominal swelling reaching to the umbilicus, and a certain amount of incontinence shown by dribbling. The temperature was normal, pulse good, respiration slightly increased. A history of gonorrhœa was obtained, but the patient gave conflicting accounts of the date at which he suffered from this disease. Naturally obstruction, due to stricture, was first thought of, but this was soon excluded as a No. 9 E. catheter was passed without the slightest difficulty. At the first sitting 2½ pints of urine were withdrawn; there was pus in the urine, which was very foul and offensive.

*Treatment.*—The following routine treatment was adopted. The bladder was washed out twice daily, after the urine had been

withdrawn, with a weak solution of sodii bicarb. and ac. boric, a certain amount being left in after each washing. Internally patient was given urotropin and a mixture of liq. ext. ergot and tr. nucis vomicæ, the object of the latter being to increase the contractility of the bladder. The general toilette of the body was also attended to. On the 16th the urine was much clearer, but there was no improvement in the tone of the bladder; the dribbling had, however, ceased, which showed that the sphincter vesicæ was acting better. There was no improvement for another four or five days, until on the 21st the patient passed about six ounces of urine. The flow was, of course, very weak, and the act of micturition on this occasion occupied about ten minutes. From that day onwards improvement, though gradual, was very steady, and now (March 3rd) patient passes urine quite easily, and there is no more cystitis. Unfortunately, he refuses to stay in hospital any longer, and so it is rather difficult to say whether the improvement is temporary or permanent. He feels greatly relieved, and has promised to return should there be any sign of recurrence.

*Remarks.*

The series of events in this case does not appear quite clear. The cystitis and residual urine are easily understood, but not the sudden distension. The symptoms in this case were identical with those occurring in spinal cases, of which there were no signs whatever; moreover, in a nervous case one could not expect such marked improvement in such a short time, the bladder functioning normally, as far as can be seen, in less than three weeks. Syphilis can also safely be excluded. There was a history of gonorrhœa; but even granted that the gonococcus had migrated via the posterior urethra to the bladder, it would not produce such a train of symptoms, and the gonococcus has no special affinity for the nerves of the bladder or of any other organ. I might also add that, though frequent smears were taken from a purulent discharge at the anterior urethra, no gonococci were ever found; this, I think, will allow us to rule out gonorrhœa as the cause of the trouble.

The only literature in my possession with any allusion to this form of atony of the bladder is Thomson Walker's "Genito-Urinary Surgery," where he says that in all his cases the power of voluntary micturition remained, although greatly impaired. Further on he gives as the cause of such cases "a lesion in the lowest reflex centres of the bladder—namely, the hypogastric and hæmorrhoidal plexus of the sympathetic, ..... but why such a lesion should remain confined to the bladder centre in all these cases is difficult of explanation" (1914, p. 537). For lack of a better explanation one has to accept this one just given, but I would be grateful to know if anybody who has had similar cases has arrived at a more satisfying conclusion.

## A NOTE ON A
## LIVING FOREIGN BODY IN THE EAR.

BY ARTHUR WOOD, M.B., B.CH. CAMB., &C.

RECENTLY a man came to see me in urgent haste, saying that he had an "animal" in his ear. Three-quarters of an hour previously he had been walking near a wall which was well warmed in the sun, when suddenly something flew into his ear from the wall. He had been syringed with water and had had oil poured in, but it had not killed the creature, for it was still making a loud and most unpleasant noise. With the aid of a syringe I easily removed a moth, which was about the size of a silver-Y; the remnants of its wings were very dark. Naturally these were frayed and almost scaleless, but it was still alive, though it had been subjected to so many and various douches. I have extracted a dead but unsuspected earwig, the patient not having the slightest idea when it got in, but I have never seen a moth, nor would I have thought it possible for the insect to get in before the man had caught it by the tail.

Rugby.

DONATIONS AND BEQUESTS.—**Miss E. A. Maynard** has by her will bequeathed £5000 to the Ranyard Mission, which has 85 district nurses working in different parts of London, and a similar sum to the Church of England Zenana Missionary Society.—The late Mr. W. Lewin, of Wellingborough, left £21 to his medical attendant as a token of appreciative regard.

# Medical Societies.

## CONGRESSES OF PHYSIOLOGY.

PARIS: INTER-ALLIED CONGRESS OF PHYSIOLOGY.

THE Inter-Allied Congress of Physiology—for the present, at least, no longer an International Congress—met at Paris from July 16th–20th. CHARLES RICHET, the learned and eloquent Professor of Physiology in the Faculty of Medicine was the appropriate President, having been appointed by the International Congress at its last meeting, held before the War in Groningen.

*Presidential Address.*

In his address of welcome to the members the PRESIDENT said that this was the first meeting of the Congress on French soil, to which he cordially welcomed them. He referred in elegant and appropriate terms to the memory of those workers in physiology and allied sciences whose deaths had occurred since the last meeting of the Congress. The President's message, addressed more especially to his younger listeners, was "Cherchez à connaître les choses, l'utilité viendra plus tard; c'est d'abord la connaissance qui importe." In illustration of this advice he referred to the fruitful, yet at the time seemingly unpractical, investigations of Claude Bernard on the sugar-forming function of the liver. In the same connexion he spoke of his own researches on anaphylaxis—a word coined by himself—a condition which has found abundant application in practical medicine and therapeutics. His first investigations were carried out with Portier on board the yacht of Prince Albert of Monaco when on a scientific voyage to South America, the experiments being made on birds with the poisons obtained from certain sea anemones living in tropical waters. The President concluded by the reflection that there were three great problems confronting physiologists at the present time. First the whole question of nutrition and alimentation, including that of vitamines. This "infamous war" had shown clearly that our conceptions of the minimal alimentary ration were erroneous, and that the rôle of fats in nutrition, of which we previously had but little knowledge, was of profound importance. The mysterious nutriments known as vitamines called into serious question the physiological value of our methods of cooking. The second great problem was the physiology of the brain. For almost 40 years this subject had scarcely made any progress. Our ignorance of ideation, memory, psychic reflexes, and their localisation was almost complete. The third question was both vast and obscure—heredity, and quite pertinently the speaker asked why physiologists left this problem to botanists, zoologists, and agriculturists, and commended the study of the lower animals and microbes in this regard. By prosecuting research with ingenuity and ardour surprises and discoveries would be found both numerous and happy.

*Other Communications.*

Numerous interesting communications followed.

M. DOYON, of Lyon, gave a demonstration on Blood Coagulation, bearing especially on antithrombin and nucleinate of soda. The substance in the blood which prevents coagulation in "peptone-plasma" seems to be of nuclear origin, and owes its activity to specific phosphorus compounds. From plasma—from a dog injected with peptone—by heating and dilute acetic acid, there is obtained a precipitate of coagulated proteins—amongst them a nucleo-protein containing 3 per cent. of phosphorus, which is capable of preventing coagulation of the blood in vitro. It seems to be derived from the nuclei of cellular organs; in fact, from all the tissues of the dog can be obtained an anti-coagulant substance identical in action with that present in dog's peptone-plasma. Blood shed directly into a solution of nucleinate of soda remains fluid, and in a few hours undergoes marked hæmolysis. The

addition of calcic chloride rapidly determines coagulation. The soda salts of all the nucleic acids possess the same anticoagulative property and oppose the action of the fibrin ferment. Nucleate of soda prevents the action of yeast on sugar and that of the liver on glycogen.

P. HEGER, of Brussels, described hypertrophy of the right heart as an adaptation to altitudes. A relative hypertrophy of the right heart has been observed in the ptarmigan living in the high Alps, and careful measurements of races of cattle acclimatised to altitudes confirm this. The cause of this relative hypertrophy is to be sought in the fact that diminution of the atmospheric pressure causes a persistent pulmonary hyperæmia, leading to overfilling of the right ventricle, a condition that can be determined in vivo by alterations visible in the electro-cardiogram in an animal placed in rarefied air. The resistance to the contraction of the right auricle and retardation of the right ventricular systole and more rapid contraction of the left ventricle can be followed.

GUIEYSSE-PELLISIER, of Paris, described the histological effects when 1–2 c.cm. of oil were injected into the trachea of rabbits or 10–15 c.cm. into dogs of middle size. The oil is immediately atomised and reaches the air cells, where it is easily found six hours after injection. After several days the globules undergo lipolysis, the pulmonary parenchyma is more or less hypertrophied, and soon all trace of oil disappears.

E. ABELOUS, of Toulouse, discoursed on secretin, whose function he regards as very wide and general, and destined to activate metabolism as a whole. Its injection augments the autolytic power of the tissues, the urine contains more salts and nitrogenous matters, the respiratory exchanges are greatly increased, the blood-sugar and the blood-cholesterol augmented, and that of the liver diminished.

J. CAMUS, of Paris, described the making of permanent biliary fistulæ, with or without cholecystotomy. To get a good result the common bile-duct must be well isolated for a considerable length and the sphincter of Oddi removed, with a lozenge-shaped part of the duodenum, before it is stitched into the abdominal wall. The duodenum is then carefully closed. Hæmorrhagic pancreatitis can be produced experimentally by injecting bile or intestinal juice into the duct of Wirsung.

J. CAMUS and G. ROUSSY, of Paris, showed dogs with experimental lesions of the base of the brain in the region of the hypophysis without injury of this organ itself. There was permanent polyuria—four or more litres daily; considerable genital atrophy; infantile penis and testes very small, with marked adipose accumulation.

According to ABELOUS and F. SOULA (Toulouse) the spleen has a cholesterinogenic function. The blood contains more cholesterol after intravenous injection of secretin, and there is no increase after excision of the spleen. The splenic vein blood in vivo contains more cholesterol than the splenic artery. Splenic pulp in suspension incubated in vitro with 2 per cent. sodium fluoride shows increase of cholesterol, the sources being chiefly cholalic acid and soaps, the transformation being effected by a ferment which is found in a filtered fluorated watery splenic solution. Amongst other organs only the liver and nerve tissue—but in much less degree—form cholesterol; the adrenals, thyroid, kidneys, ovary, and genital glands and muscles have no such power—they destroy cholesterol.

The next meeting of the congress will be held in Edinburgh in 1923.

### HAMBURG: GERMAN PHYSIOLOGICAL SOCIETY.

This society held its meeting at Hamburg from May 26th–28th.

R. PLAUT, of Hamburg, showed the pelves of rabbits and guinea-pigs (9–13 weeks old) of both sexes, fed with ether-extracts of cows' ovaries. The effects were produced only with extract of the corpora lutea. The extract caused change in the form of the pelvis, which was similar to that of the adult animal; there was a widening of the upper symphysial angle, and an approach of the upper margin of the symphysis to the promontory.

R. DITTLER, of Leipzig, described a means of sterilising the female organism by a humoral method. By introducing parenterally living spermatozoa spermatotoxic substances are formed and are present in the blood; thereby it is possible to make adult female animals temporarily incapable of becoming impregnated in the normal way. In order to arrive at a sufficient concentration of the antibody at the place of meeting between the ovum and sperm—i.e., in the ovum itself—there must be several repetitions of the introduction of the antigen; the whole preliminary treatment requires at least 6–7 days. The sterility may last four months or longer, and is completely reversible. A current pregnancy is not interrupted by a corresponding sperm treatment. After several injections of large doses of human spermatozoa the animal experimented on shows the normal capacity for fertilisation with spermatozoa of its own species.

# Reviews and Notices of Books.

### ATLAS FOR ELECTRODIAGNOSIS AND THERAPEUTICS.

By F. MIRAMOND DE LAROQUETTE, M.D. Authorised translation by MARY GREGSON CHEETHAM, with Foreword by ROBERT KNOX, M.D. London: Baillière, Tindall and Cox. 1920. Demy 8vo. With 69 plates and figures in the text. Pp. xvi. + 180. 15*s.* net.

THIS work was prepared with the object of providing, in convenient form, an account of the anatomical facts necessary as a basis for the practice of electrodiagnosis and physiotherapy. One half of the book deals with the muscles, nerve trunks, and plexuses. Under the heading of each muscle are described the origin, insertion, action, nerve-supply, position of motor point, and the strength of the galvanic current required to cause a minimal contraction with both anode and kathode. The position of the nerve plexuses, the course and distribution of the nerve trunks, and the regions where the latter are accessible for electrical testing are indicated. Numerous plates illustrate dissections of the muscles and nerves, the position of the motor points, and the areas of cutaneous nerve-supply. Notes are added on points to be observed when testing for electrical reactions, and tables are appended giving the author's "coefficient of excitability" of different muscles and nerves. About one-third of the book is occupied by descriptions of the joints, special attention being paid to their mechanical function and range of movements. A short account is given of the motor and sensory tracts of the central nervous system and of the structure of the skin.

The atlas will be extremely useful to those who are learning electrodiagnosis and physiotherapy. The various anatomical and electrical data necessary for the study of these subjects are scattered through various text-books, while the work under review presents them in a compact form, and in addition contains original work of the author on the electrical excitability of the various muscles and nerves. The work is clearly translated and is easy to understand. To English readers the anatomical nomenclature may be confusing, but this will not impair the usefulness of the book. The translation of some terms are unfamiliar—for example, "electrical swab," by which is evidently meant "testing electrode." On p. 7 Burdock should read *Burdach*.

### VERGLEICHENDE ANATOMIE DES NERVENSYSTEMS.

Die Leitungsbahnen im Nervensystem der Wirbellosen Tiere. Von Dr. Æ. B. DROOGLEEVER FORTUYN, Lector der Histologie, Reichs-Universität, Leiden. Erster Teil. Mit 116 Abbildungen im Text. Haarlem: De Erven F. Bohn. 1920. Pp. 370. 25*s.*

THIS is the first part of a work on the Comparative Anatomy of the Nervous System, projected by C. V. Ariëns Kappers and the author. It was undertaken at the request of Dr. Kappers, who will deal with the Nervous System of the Vertebrates. It is not a com-

pendium on the structure of the nervous system in the invertebrates, but the subject is something far more restricted and, in some senses, more difficult, viz., the conducting paths in the nervous system of invertebrates, which postulates a wide knowledge of the outer and inner anatomy of invertebrate structure. The author has been at immense pains to collect, sift, and put together the various and very scattered references to this subject which are to be found in the comprehensive literature which he cites. He has supplied a great want in invertebrate nervous physiology, and is warmly to be congratulated on the result of his painstaking and highly successful effort. Part of the expenses were defrayed by the Dutch Minister of Art and Sciences.

The idea of conducting paths is clearly one obtained from vertebrate anatomy and physiology, where the types of central nervous system are few, and the conducting paths—at least the peripheral—are obvious and well defined. Far otherwise is it in most invertebrates, in which it is sometimes difficult to determine what part of the nervous complex is to be called central and what peripheral. The nerves for the most part are non-medullated, and the methods for their study and distribution correspondingly restricted, although the methylene-blue and Cajal methods have in many cases proved most useful. Moreover, the fundamental conception of the independence of the neuron and the relation between neurons by contiguity and not by continuity scarcely obtains in the invertebrates, where the nerve cell or neuron may have two or more processes which anastomose with similar processes from adjoining nerve cells, scattered under the epithelium or in the walls of viscera, forming wonderful nerve nets with the cells at the nodes, permitting of conduction it may be in several directions. Nor is the nerve cell the only formed element in the invertebrate nervous system where we have the doctrine of the uninterrupted connexions of the neurofibrils propounded by Bethe. Conduction is far more diffuse—especially as seen in the cœlenterata—though each ganglion cell has only a few direct connexions with adjoining nerve cells, resulting in certain definite groups and a certain limitation in the direction of conduction. The author gives a systematic exposition of his results from porifera or sponges, which do not appear to possess a nervous system at all, to arthropoda and cephalopoda, ending with a short account of amphioxus. As a rule, cœlenterata possess a nervous system chiefly composed of a subepithelial plexus of ganglion cells, which anastomose by means of broad processes, while other processes serve for the innervation of muscle cells and others pass directly to the basal or centripetal processes of epithelial cells belonging to receptive sensory cells, something corresponding to the olfactory sensory cells in vertebrates. Even amongst what appears so well-defined a group as the "vermes," the structure of the nervous system in its different classes and orders is so little uniform that it is not possible to unfold a general type, hence the author requires about 90 pages and many diagrams to set forth what he has to expound. To the mollusca 60 pages are given, and even then the author has to admit how large are the lacunæ in our knowledge as to conduction in even the highest group—the cephalopoda. Amongst echinoderms, although we know something of their nerve reactions and intensely interesting physiology, the author is shocked that we know so little about the paths of conduction. Nor are the causes far to seek in all the five classes of this group, and so the story is soon told in 10 pages. A specially full account (over 150 pages) is given of the arthropoda, illustrated like other groups by many schemata, which are helpful in enabling the reader to follow the rather intricate connexions which obtain here as elsewhere. The sense organs come in for a careful study as the primary receptive organs for the origination of impulses.

Altogether this is a most praiseworthy and illuminating exposition of what is known of the nerve-conducting paths in invertebrates. To zoologists especially it will be welcome, and to those few physiologists who devote attention to comparative physiology of the invertebrates. What strikes one in looking over the very extensive bibliography given by the author is the paucity of memoirs bearing English or American names. In this volume is laid the foundations on which, we hope, will be built many fascinating inquiries on the nervous physiology of invertebrates, an immensely wide and almost virgin field of investigation.

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### DIAGNOSIS OF BACTERIA AND BLOOD PARASITES.

By E. P. MINETT, M.D. Third edition. London: Baillière, Tindall and Cox. Pp. 94. 4*s.* 6*d.*

THE intention of the author of this small volume, who is government medical officer of health in British Guiana, is "to provide a pocket reference book for use in the laboratory by students and practitioners who may not have time to consult standard works on the subject." The need for such a book is no doubt often felt by those who work in improvised laboratories, remote from large towns and libraries, and may be felt by those who, whilst within easy access to standard works, like to possess within a small compass brief descriptions of the principal technical procedures. Such a book, to be of value, must be accurate and reliable from the first page to the last; it should contain an account of the best technique for each subject it touches upon; the descriptions ought to be concise and the phraseology clear and unexceptionable; and, finally, wherever it is impossible to give at least sufficient information to enable the practitioner to carry out successfully the operations indicated the subject should be omitted.

The volume under notice fails in all these respects. With regard to accuracy, on p. 9 *B. welchii* is classed as a motile organism, though this is qualified later on p. 10 by the statement that it is often non-motile. "*B. enteritidis sporogenes*" is now generally regarded as a mixture of organisms, though the author includes it (p. 9) as a definite species. The account of *vibrion septique* omits mention of the most characteristic property of this organism—namely, the formation of long filaments in the peritoneal sac of inoculated animals. The medium recommended for the cultivation of *B. influenzæ* is blood agar, in spite of the large amount of recently published work on "altered blood" media. For the investigation of a suspected case of cerebro-spinal fever the author recommends that a throat-swab be taken; a lumbar puncture would be more to the point. Ultramicroscopic organisms are described as "substances," a term properly applied to inert matter.

These are sufficient examples of errors, omissions, and the improper use of words to indicate that the book may mislead uninstructed readers.

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### DISEASES OF THE NOSE AND THROAT.

Fourth edition. By HERBERT TILLEY, B.S. Lond., F.R.C.S. Eng. London: H. K. Lewis and Co., Ltd. With 74 plates and numerous text illustrations. 1920. Pp. xx. + 844. 25*s.* net.

THIS book has already passed through three editions, and by so doing has proved that its value is well appreciated. The work has grown with each successive edition, and the present volume again shows a notable increase in size. The fresh illustrations are equal in value and execution to those which they supplement, and have increased in quantity. An attractive part of this edition is that devoted to the tonsils, both the development of the structure, its pathological states, and function being carefully reviewed. Much more attention is paid to the operation of tonsillar enucleation than might at first sight appear warranted on account of its relative simplicity. But the present views of specialists in diseases of the throat, nose, and ear, are more in line with those of general physicians than was the case in previous years. Now the relatively small and soft tonsil is no longer regarded as innocuous, but the tonsil is recognised as the great portal through which much disease finds entry into the system. Hence a description as full as Mr. Tilley's is really quite advisable. There are naturally different views about such matters as paroxysmal sneezing and rhinorrhœa, and we are not quite with the author in considering the terms synonymous, or in holding that the conditions are due always to the same cause. On p. 42

we are glad to see a useful and pertinent warning against carelessness in intranasal treatment by operation and the ill-effect which may ensue. On p. 160 Mr. Tilley advocates the employment of powdered chalk as a dentifrice during the administration of mercury. This recommendation is at variance with the theory of many dental surgeons that powdered chalk is injurious by damaging the mucosa of the fang-socket and so leading to Riggs's disease.

We congratulate the author upon the success of his arduous task of revision, and have no hesitation in recommending his book to the practitioner as well as to the prospective specialist.

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CURIOSA DE MÉDECINE.

By Dr. G. J. WITKOWSKI. Paris: Libraire Le François. 1920. Pp. 272. Fr. 6.

Dr. Witkowski is well known as a diligent seeker in the by-ways of medicine and anatomy as exemplified in art and literature, especially of Mediæval and Renaissance times. In his latest book now before us he has collected a number of odd incidents, epigrams, pictures, carvings, and the like, mainly of that kind to which is applied the term "curious" in secondhand booksellers' catalogues, but, as a whole, we cannot say that the collection is particularly interesting. Items worth noting are p. 35, a reproduction of a drawing by Louis XIII. executed at the age of 6, which certainly shows astonishing precocity, and, moreover, resembles in execution such drawings by primitive man, as, for instance, the well-known Femme au renne, of the "Reindeer Period," the art of the comparatively modern child thus reproducing the art of the childhood of the human race.

On p. 29 Dr. Witkowski gives his reasons, together with an explanatory diagram for thinking that, contrary to the expressed opinions of the 31 medical men who signed the report of the post-mortem examination on Henri IV., the mortal blow was the first and not the second. On p. 143 is a reproduction of a most interesting photograph found in a German officer's baggage of the Emperor William and the King of Saxony. The Emperor's photograph clearly shows his withered left arm, which is generally disguised in official portraits. The paralysis is due, says Dr. Witkowski, to some obstetrical injury and not to infantile paralysis. The punning latin distich on p. 227 entitled "Advice to Youth," is printed as follows:—

"Quid facies Veneris cum veneris ante?
Ne sedeas; sed eas, ne pereas per eas."

but obviously there should be a second "facies" after the word "Veneris," both to complete the hexameter and to carry on the verbal equivoque.

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THE ESSENTIALS OF HISTOLOGY.

Descriptive and Practical. For the Use of Students. Eleventh edition. By Sir EDWARD SHARPEY SCHAFER, F.R.S., Professor of Physiology in the University of Edinburgh. London: Longmans, Green, and Co. 1920. Pp. 577. 14*s*.

ORIGINALLY published in 1885, now greatly expanded and illustrated by 720 figures in the text, many of them in two well-chosen colours, and several photographs, the illustrations judiciously selected or reproduced from original preparations, the whole forms an admirable conspectus arranged in 50 lessons, wherein by far the largest part is descriptive. Shorter details as to the actual "preparations" or "slides" which the text describes and elucidates precede each lesson, intended to occupy from one to three hours of practical work in a class under the direction of the teacher. The pupil is not distracted by a multiplicity of methods, for only those are recommended upon which experience has proved that dependence can be placed. So numerous and faithfully reproduced are the illustrations that a student in revising his work by glancing over the pages can through the eye rapidly cause to recur to memory the actual pictorial impressions as seen with the microscope. The illustration showing the successive effects of water and other reagents upon a red blood corpuscle—printed in red—might give a false impression, as decolorisation is so marked an effect of certain of these reagents. So also in the figures of blood corpuscles of the frog and those of amphibian erythrocytes the red is very bold and arresting, but the actual faint yellowish colour tinge in the original corpuscle is missing. In edition after edition new figures have been added, so that there are but few parts of the body corporate whose structure is not represented pictorially. The most condensed and the most difficult lessons are the four on the central nervous system, while three lessons are given to the eye, requiring 11 preparations to be made.

The Essentials contain all and perhaps more than all the student requires to meet the exigencies which befall him in his medical career.

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A TEXT-BOOK OF HISTOLOGY.

Second edition. By HARVEY ERNEST JORDAN, A.M., Ph. D. London and New York: D. Appleton and Co. 1920. With 594 illustrations in the text and 4 plates. Pp. 857. 25*s*.

THE appearance of a second edition of this text-book less than four years after its publication is proof that it has found favour in medical schools. This edition has been considerably improved by the substitution of drawings for some of photomicrographs, though, even now, a few photographs of doubtful value have been retained. Another welcome addition is the section on the directions for laboratory work, which gives a very satisfactory scheme for a course of practical histology.

This text-book will fulfil all the requirements of the medical student. It is clearly written and adequately illustrated, and while it is not too long or complex, everything which it is necessary for the student to know is included.

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ESSENTIALS OF SURFACE ANATOMY.

Third edition. By CHARLES R. WHITTAKER, F.R.C.S. Edin., F.R.S.E. London: J. and A. Churchill. 1920. With 17 plates of 27 figures. Pp. 80. 7*s*. 6*d*.

THIS handbook deals shortly with surface anatomy in a clear and dogmatic manner. The blood-vessels and nerves are dealt with in the first two sections, regional anatomy being considered subsequently. Cerebral topography is treated with some fullness, and Chiene's method described and illustrated. Addison's markings are employed in the abdomen. There are some small differences between the teaching in this book and that usually accepted in London, but there is room for variations of this sort. Altogether the book seems to us a reliable guide for those who wish to "get up" their human landmarks.

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GREEK SCIENCE AND MODERN SCIENCE:

A Comparison and a Contrast. Being an Inaugural Lecture delivered at University College, London, on May 12th, 1920, by CHARLES SINGER, Lecturer on the History of Medicine. London: University of London Press. 1920. Pp. 22. 1*s*. 6*d*.

IN this interesting lecture Dr. Singer points out how Greek science "was from its birth inextricably interwoven with philosophy," but that modern science passed through its earlier stages of development without this relationship. Science in mediæval times was limited on every side and forbidden the right of speculation, but this limitation had a share in building up an effective apparatus for research. Ancient science came to "failure and bankruptcy" because, except in the case of mathematics, Greek writers set down only their conclusions, whereas modern scientific writers record, not indeed entirely, but for the most part, their investigation processes. Dr. Singer says of a modern scientific worker's paper: "He tells us nothing of how he embarked on many different lines of work and abandoned them as unprofitable or too difficult." Surely this is too sweeping a statement; at all events, there is one case to the contrary and that is Lister, who has left on record the many trials, difficulties, failures, and lines of work in which he toiled before perfecting his system. As a general statement, however, it may pass. But with Dr. Singer's final plea we can all agree—namely, that for the record of processes. "By the amount to which our processes are clearly and succinctly recorded, by

so much do we ensure the permanence of our work, by so much can we guarantee that our successors can begin where we leave off." On p. 13 Dr. Singer makes a statement which we do not consider altogether fair. He recalls how scholars ransack Eastern monasteries or the dustheaps of Egypt for any fragment of Greek literature, but "the works of our first scientific thinker, Roger Bacon, lie here at hand, unedited, forgotten, neglected." Surely the works of Roger Bacon are now in process of editing? A scheme for so doing was certainly started in 1913, a year previous to the occasion of Bacon's seventh centenary—i.e., in 1914. A committee, with the Chancellor of the University of Oxford as its honorary president, was formed to carry out the scheme, but though the war may have put a stop to the editing it is surely not the case that Bacon's works are either neglected or forgotten.

## TEXT-BOOKS ON CHEMISTRY.

*A System of Physical Chemistry.* By WILLIAM C. McC. LEWIS, M.A. R.U.I., D.Sc. Liverp. London: Longmans, Green, and Co. In three volumes (second editions): Vol. I., 1918; Vols. II. and III., 1919. Pp. 494, 404, and 210. 15*s.*, 15*s.*, and 7*s.* 6*d.* respectively.—This is a masterly work in three volumes presenting with some detail the modern developments of physical chemistry. The first volume deals with thermodynamics (the laws and relationships which govern the quantitative transformations of energy), the second volume with the kinetic theory (the molecular constitution of matter), and the third volume with the quantum theory (statistical mechanics). The direct bearing of certain branches of the subject on the progress of medical science is illustrated in many chapters, as, for example, in those on capillary action, colloids, and catalysts in Vol. I.; osmotic pressure, ion activities, adsorption in Vol. II.; and radiation phenomena in Vol. III. It is impossible to carry on satisfactorily physiological and biological researches without a knowledge of the principles underlying physical chemistry, and these volumes will be referred to with undoubted advantage by workers in this field.

*Pharmaceutical and Medical Chemistry.* By SAMUEL P. SADTLER, Ph.D., LL.D., VIRGIL COBLENTZ, Ph.D., F.C.S., and JEANNOT HOSTMANN, Ph.G. Fifth edition, revised and rewritten. London and Philadelphia: J. B. Lippincott Company. Pp. 766. 21*s.*—This text-book, intended for the use of medical and pharmaceutical students, covers considerable ground, beginning with Part I. (Elementary Physics), succeeded by Part II. (Chemistry of the Non-Metals), then Part III. (Chemistry of the Metals), and finally Part IV. (Organic Chemistry). The three authors have formed a very successful collaboration, and each is an admitted authority on the subjects which he contributes. The revisions are in conformity with modern advance, much of the new ground covered being an outcome of chemical developments arising through the war. This is particularly the case with the sections dealing with the manufacturing side of chemistry. The sections on organic chemistry show also a commendable effort to bring the book into modern lines. The carbohydrates come in for full treatment, as do the alkaloids. There is an excellent account of electrolysis and its applications. The pharmaceutical sections are based on the U.S. Pharmacopœia. The book gives evidence of labour, thought, and care, and should prove a valuable source of reference and study to pharmacists and medical practitioners in this country also.

*Organic Chemistry for Students of Medicine.* By JAMES WALKER, LL.D., F.R.S. Second edition. London: Gurney and Jackson. 1919. Pp. 332. 10*s.* 6*d.*—The treatment of the subject is severely chemical, and while affording a good foundation for assisting future study when the importance of a knowledge of organic chemistry dawns, as physiological and biological questions are approached, the work gives but a scanty reference to the medical significance of the substances described. Theoretical questions are entered into, constitutional formulæ form a feature, and technical operations—e.g., the distillation of coal, with a section on coal-tar—are described in some detail. All this is a good deal to force into a six months' course of chemistry, and there is always a difficulty in narrowing the subject in order to keep within the requirements of the student of medicine preparing for his first professional examination. But we quite agree with the author that the student should be made to realise that he has not done with chemistry when he has passed this examination.

## JOURNALS.

*Journal of the Royal Army Medical Corps.*—In a paper on Sick Wastage in the August issue of this journal Colonel A. B. Soltau discusses the diseases that caused loss of service to the army in France. Of the 106,267 cases passing through certain casualty clearing stations in 1917 Colonel Soltau considers that approximately 46,500, or 44 per cent., suffered from preventable dirt diseases. Thus 25,000 had skin diseases, 10,000 of them scabies, and 10,000 inflammation of connective tissue. These diseases are pretty easily treated if discovered by careful exact frequent inspection in their early stages. If they are to be prevented men must have sufficient baths and clean underclothing. Colonel Soltau estimates that there were 21,500 cases of trench fever. Five thousand are so named, and there are, moreover, 15,000 cases reported of pyrexia of unknown origin (80 per cent. at least trench fever); from the 5000 labelled myalgia Colonel Soltau takes 3000 as trench fever, and from the 5000 cardiac and debility cases 1500 more, and thus arrives at the figure of 21,500. To prevent this high morbidity from dirt diseases he urges that in future each unit shall have a standard pattern disinfestor, where men shall simultaneously bathe, have their outer clothes disinfested, and be given clean underclothing; then "the louse and the acarus will not again play havoc." He also urges the appointment of standing boards of specialists at the bases to allot to suitable work men partly disabled. Enthusiasm carried many feeble men through enlistment; they broke down on service and drifted continually through the hospitals, unfit for the line. These standing boards proved a great success in Egypt. Amongst the same group of casualties (106,267 in all) there were 7000 venereal cases, 3000 trench feet, 258 tubercle, and 3500 each of influenza, bronchitis, and mental disease. The second part of Colonel Soltau's paper is also very important, and discusses where these cases should be treated with a minimal loss of service. He claims that in the army zone, if at all possible, is the best place. Evacuation of the sick is unfortunate in its results. The sick retained are more anxious to get well; they rejoin their own units more quickly and there become useful in a shorter time than do new men, with consequent improvement of the morale of their units. The man evacuated cost a great deal and was apt to become "hospitalised" and disinclined to return. It was well to have convalescent centres in the army zone. Thus the Fourth Army, which in the winter of 1917–18 made a C.C.S. a convalescent centre for each corps, returned to duty 20,000 men, of whom half would otherwise have been evacuated. Though holding perhaps the worst part of the line, this army kept its evacuations below those of the other armies. Men do not get quiet nowadays even in base hospitals, for these, too, are subject to hostile aircraft attack. In the same number of the journal Major Angus Macdonald states that the last epidemic of malaria in England occurred in 1857–60; that malaria prevalence in England is not regular but intermittent and depends on the presence of carriers and a mean monthly temperature of 59° or over. In 1857-59 the mean monthly temperatures at Greenwich for June, July, and August, were all over 59°, and malaria was prevalent. In 1860 the mean temperature of each of these months was under 59°, and the prevalence of malaria in England ceased. In 1917–18–19 malaria appeared in England after the mean temperature had been for a month above 60°. All were *P. vivax*.—Lieutenant-Colonel G. B. Crisp gives a quantity of useful advice as to outfit and financial conditions to officers going to Hong-Kong, which he describes as a delightful station.—Lieutenant-Colonel G. H. Younge discusses 180 cases of appendicitis which occurred in three years in his hospital at Grantham.

*The Bulletin of the Naval Medical Association of Japan* for June, 1920, contains an interesting article by M. Ishihara, Surgeon Lieutenant-Commander, I.J.N., on the Effect of Experimental Extirpation of the Thyroid Body. From his observations on young rabbits from which the thyroid was removed the author arrived at the following conclusions: 1. Excision of the thyroid in young rabbits is followed by enlargement of the thymus, probably due to a compensatory action existing between these two organs. 2. Differing from the views advanced by Hofmeister and v. Eiselberg, growth and metabolism in rabbits are not interfered with by extirpation of the thyroid. 3. Degenerated corpuscles of Hassall are met with more frequently in the thymus of normal than in that of dethyroidised rabbits; and removal of the thyroid is not necessarily followed by enlargement of the pituitary.

# FRENCH SUPPLEMENT TO THE LANCET

*Under the Editorial Direction of*

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## FRENCH RESEARCH ON GAS GANGRENE.

BY E. SACQUÉPÉE,
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THE appearance of numerous cases of gas gangrene in connexion with wounds received in the war has been a great surprise to French medical men. As a result of the progress of modern methods of treatment this malady had nearly disappeared from peace-time practice. The present medical generation hardly knew it except by name, never having had occasion of observing it.

At the outset it created some confusion, but also a firm determination to get a nearer acquaintance with this very serious complication in order to fight it better. Based on clinical observation, these efforts have aimed above all at elucidating the pathogeny of the accidents. It was clear that the complication was of infectious nature, and it was therefore first of all necessary to find out the species of microbe which were responsible for the accidents. Once this were accomplished it would be possible to think out some specific therapy with which to meet them.

We propose to explain the researches made in the course of the war in the same order—clinically ascertained facts, pathogenic studies, specific treatment.

### I. *Clinically Ascertained Facts.*

We must first briefly sum up the clinical facts in order to show what French doctors have understood under the name of gas gangrene. The complaint being previously hardly known, some mutual agreement as to the connotation of words was above all necessary.

By the name "gas gangrene" we mean an extremely grave complication of the wounds, characterised at once by local and by general symptoms. The local symptoms are essentially gaseous infiltration, œdema, deterioration of the tissues (especially muscular) with gangrenous tendency, and a characteristic smell. The importance of these great symptoms varies from case to case; hence the manifold clinical types. In addition, various types of erythema (especially bronzed), phlyctenoses, &c., may be observed.

The general symptoms are constant and are marked by extensive poisoning, characterised especially by increased rapidity and extreme weakness of the pulse, dyspnœa without thoracic lesion, earthy—sometimes icteroid—colour of the skin.

Unless treated by specific means, this very serious affection proves fatal in about 75 per cent. of cases within a day or two.

From this summary description it follows that the facts studied in France under the name of gas gangrene correspond above all with the serious forms of gaseous infection of wounds. Besides the latter there is a large number of other gaseous infections, far less serious, not accompanied by the general phenomena described above, amenable to purely surgical intervention. In view of their comparative benignity these lighter forms have been studied very much less.

The clinical picture just described had to serve as a basis to the pathogenic studies. The germs supposed to be the agents of the gas gangrene had really to be capable of reproducing the double series of symptoms—local manifestations and general intoxication.

### II. *Pathogenic Studies.*

In order to get the full advantage of the progress made with regard to the pathogeny it is convenient to specify what our knowledge of the matter was before the war.

It is well known that, following Davaine in his study of "experimental septicæmia," Pasteur showed that this infection is due to the *Vibrion septique* (1877). Chauveau and Arloing (1884) then demonstrated that this same germ also existed in gas gangrene in human beings.

Clinical researches into the question then became very difficult in France, since the first effect of the application of Pasteur's principles to surgery was to render gas gangrene extremely rare.

On the other hand, in foreign countries, especially in Germany and America, the study of certain new facts was possible. Welch and Fraenkel and, following them, a number of other authors, charge Welch's bacillus (the *Bacillus perfringens* of French writers) with being the main cause. According to these works the *Vibrion septique* seems entirely wiped out as far as its influence goes.

#### *Progress of Knowledge During the War.*

Such was the state of our ideas about 1914. We are now in a position to follow their development in the course of the war.

During the first stage the predominant theory of the pre-war period was followed. *Bacillus perfringens* plays a leading part. Indeed, its importance is such that there is hardly any question of other microbes. Weinberg, Sartory and Spillman, Doyon and Yamamouchi, and Orticoni, all invariably, or nearly invariably, find the *B. perfringens*.

The second stage opens with our first work in May and June, 1915, based on the following principle: the best criterion of a pathogenic species is constituted by its ability to reproduce the malady experimentally. Now, the *B. perfringens* can reproduce the local lesions of the gangrene, but it cannot be made to produce a potent toxin. There is, therefore, reason to examine whether there are not in the gangrenous tissues other pathogenic germs which comply better with the experimental criterion.

In the great majority of cases investigations in this direction gave an affirmative answer. We found either the *Vibrion septique* or a new bacillus which was later to receive the name of *Bacillus bellonensis*. These two germs are pathogenic for animals, in vitro they provoke the formation of very active toxins, experimentally they produce lesions closely analogous to those observed in cases of gas gangrene in man.

Working on similar lines, Lardennois and Baumel then proved the frequency of the *Vibrion septique* (about one-quarter of the cases), Weinberg and Séguin also announced the existence of the *Vibrion septique* in certain gas gangrenes, and also of another germ, called by them *Bacillus œdematiens*, probably identical with the *B. bellonensis*.

In this way it gradually became clear that gas gangrene was associated with three species of organisms—*Bacillus perfringens*, *Vibrion septique*, and *Bacillus bellonensis*, acting either alone or in association. And the Inter-Allied Surgical Conference, meeting at Paris, adopted analogous conclusions:—"Among the germs met with there is reason to retain the *Vibrion septique*, *Bacillus bellonensis* (the exact relations between the *Bacillus bellonensis* and *Bacillus œdematiens* are not yet made clear), and *Bacillus perfringens*."

#### *Confirmation of the Pathogeny Adopted.*

How well founded was this conception was to be proved later by the experimental application of seropathy, thanks to the proof afforded by the "protected guinea-pig," which de Lavergne discusses in another article. It is well known that the tissues of typical human gas gangrene are always pathogenic for the guinea-pig, which succumbs on inoculation. If the above-mentioned germs are really the essential agents of the affection it must be possible to "protect" the animal, if it is inoculated, simultaneously with the gangrenous tissues, with the three serums respectively specific to each of the three germs. Experiment confirms this; inoculation with the three serums, antiperfringens, antibellonensis, and antiseptique, carried out at the same time as with the infectious product, is enough to protect the animal in 96 per cent. of cases.

It is therefore safe to conclude that the pathogeny adopted is certainly correct in the great majority of cases. The other germs described as existing in gas gangrene, such as Weinberg and Séguin's *Bacillus fallax*, are therefore of only very small importance.

To make our conception quite clear we add here the results of the analysis of 121 cases under our personal supervision. *Bacillus perfringens*, 82 per cent.; typical *Vibrion septique*, 28 per cent.; non-typical *Vibrion septique* 11 per cent.;

*Bacillus bellonensis* 35 per cent. The germs are very often associated in pairs.

If we limit ourselves to the facts recently discovered during the war, we need not repeat the history of the *Bacillus perfringens* and the *Vibrion septique*, as both are known from previous investigation. In particular we knew that the *Vibrion septique* is not only highly pathogenous but also highly toxic; the researches of Leclainche and Vallée had shown this.

*The Bacillus Bellonensis.*

On the other hand, the *Bacillus bellonensis* being a new species it is necessary to describe it briefly. It is often found to predominate, sometimes it is even the sole species of anaerobe in a rather special clinical form —viz., white erysipelas.[1] In the other forms it is more usually fairly difficult of detection in the midst of other species of anaerobe better adapted to artificial surroundings.

The *Bacillus bellonensis* is a strictly anaerobic germ. It presents the appearance of a straight or slightly curved bacillus in the organism, polymorphic in artificial mediums, slightly or not at all mobile, ciliated, sporulated (oblong or oval spores), colours easily with Gram's solution.

Cultures develop easily. In a deep glucose agar stab culture the colonies appear in 24 hours, formed of a yellow-brownish, opaque central nucleus, with a paler nimbus formed of unequal filaments easily visible on enlargement. These colonies clear up and seem to dissolve after three or four days.

In glucose broth culture is visible in 24 hours, at first homogeneous disturbance with gaseous discharge, then appearance of flocculent deposit with clearing of supernatant fluid, the whole being complete within 36 or 48 hours.

*Pathogenic qualities* are highly developed, especially in the guinea-pig and the rabbit. In this connexion it is useful to distinguish two types of microbe which cause fairly different lesions in the animal.

The first and most frequent type causes in life the formation of a hard and very extensive œdema; death supervenes quickly, sometimes within nine hours. Autopsy reveals a huge, tremulous, colourless, or faintly tinted œdema, infiltrating the tissues to a great distance, in some places from 1 to 2 cm. thick; gaseous infiltration and muscular lesions are slight or nil. In such cases the germs are always scarce, except at the point of inoculation.

With the second type inoculation produces a local tumefaction, gaseous crepitation, coldness of the limb, various colours (violet, livid, ham-coloured), sometimes phlyctenules. On autopsy very extensive, rose or brownish gelatinoid œdema, with slight but appreciable gaseous infiltration.

Both types are toxic, above all the first. The two or six days' old filtrates (Chamberland's candle) of cultures in a liquid medium are pathogenic for the guinea-pig and the rabbit, in doses varying according to the specimens and conditions of culture; for the guinea-pig the fatal subcutaneous dose varies from 1/600 to 1/2 c.cm.; the sole lesion that can be observed consists in an enormous colourless œdema.

The *Bacillus bellonensis*, then, constitutes a highly pathogenic, very toxic species, capable of reproducing perfect gas gangrene experimentally.

III. *Specific Treatment.*

Acquaintance with the three essential species, *V. septique*, *B. bellonensis*, *B. perfringens*, makes it possible to consider the specific serotherapy successfully.

The first attempts at serotherapy were not very effective, since they really aimed exclusively at the species mentioned at the beginning, *B. perfringens* and *V. septique*, taking no account of a third agent of capital importance, the *B. bellonensis*. It is only by applying a specific serotherapy either against all three germs or against the germ involved in each particular case that a practical result can be reached.

The preparation of the serums follows the general principles already established in bacteriology. For toxic germs it is important to prepare the animals for inoculation of the toxic products; so far, indeed, the antitoxic serums prove more efficacious (antitetanus, antidiphtheria serums, &c.). On the other hand, when germs with feeble toxicity like *B. perfringens* are dealt with the procedure in preparing the serums is far less fixed.

By way of example let us cite the preparation of the antibellonensis serum. A horse is first inoculated subcutaneously with small doses of toxin (0·5 to 1 c.cm.), and the inoculations are continued, increasing the doses progressively up to one and a half or two litres. At this point direct inoculation into the veins takes place. In this way sufficiently strong serums are obtained to protect the animals for the experiment against 80,000 to 120,000 fatal doses of toxin. There is, by the way, no technical difficulty in obtaining more active serums, it is merely a matter of doses, toxin, and time.

Similarly, for the antivibrio serum, Jouan, of the Pasteur Institute, used toxin—i.e., filtered toxic cultures. As for the antiperfringens serum, Veillon, of the Pasteur Institute, prepared it by inoculation of living cultures.

Other serums have also been used—Leclainche and Vallée's polyvalent serum (antiperfringens and antiseptique), various serums by Weinberg and Séguin (prepared against the *Vibrion septique*, *B. perfringens*, and *B. œdematiens* respectively), H. Vincent's polyvalent serum, prepared with the aid of various species of microbes met with in gas gangrene.

These various serums have been used for human patients. The really great difficulty was to know which serum was to be used in each case. In most of the cases it was decided to inject all three simultaneously, although this was evidently only a makeshift procedure. Even so, this method has given decided results, as we shall indicate below. But the discovery of some means of rapid pathogenic diagnosis was indicated, in order to get the pathogenesis and at the same time the treatment promptly on the right lines. In the last months of the war we attained this by means of the proof of the "protected guinea-pig." (See the article by de Lavergne.)

*Results of Curative Serotherapy.*

Without going into details at this place about the results obtained for each serum, we will simply recall those which are connected with the simultaneous application of the active serums against the *Vibrion septique*, *B. bellonensis*, and *B. perfringens*.

To take the curative point of view, 191 cases of gangrene have been treated, of which 136 were in full development and 55 at their commencement. As against 166 cures there were 25 deaths—i.e., a proportion of 13·09 per cent. For the sake of comparison it must be remembered that in the same regions the mortality in non-treated cases was about 75 per cent. It can therefore be seen in how far the curative treatment has been successful. It often operates in a really striking manner, for in a whole number of cases in which any surgical operation was undesirable, the shock of operation seeming to be bound to cause death, an energetic serum treatment brought about such an improvement that the operation could be carried out subsequently at leisure without any danger.

*Results of Preventive Serotherapy.*

From the preventive point of view serotherapy naturally proves itself still more powerful, and this has been the experience of a number of distinguished surgeons. Preventive treatment has been applied solely in the case of very severely wounded patients particularly exposed to gangrene (arterial wounds, extensive shattering of the buttock, thigh, &c.).

A series of wounds of the like nature, but not treated by serum, gave 7·2 per cent. cases of gangrene. Amongst the 319 cases treated preventively 4 cases—i.e., 1·17 per cent.—of gangrene were observed. Three further cases involved extensively mortified tissues (ligature, tourniquet) and were cured.

Here, again, the value of preventive serotherapy is evident, since it reduces the cases of gas gangrene to a very slight number of those wounds which are most exposed to it.

*Summary.*

As regards gas gangrene, French medical work has progressed along a logical and fruitful path of investigation. After having sufficiently defined the malady from the clinical point of view it went on to study the pathogeny. After having attained this it entered upon the path of therapeutic realisation by means of serotherapy, which has given the happiest results.

[1] Let us recall here the essential characteristics of this "white erysipelas," typical of the "œdematous forms" of gas gangrene. From the clinical point of view we note a considerable infiltration of hard, pale, œdema round the wound; muscular disturbances are slight, and gaseous infiltration small or non-existent, the smell is clearly perceptible. Evolution very rapid, nearly always fatal. On dissection of the member one finds enormous infiltration of pale or lemon-coloured liquid œdema, clearly marked muscular lesions, and slight, localised gaseous infiltration.

# THE DIAGNOSIS OF BACTERIOLOGICAL TYPES OF GAS GANGRENE

## BY MEANS OF SPECIFIC SERUMS.

BY DR. DE LAVERGNE,
PROFESSEUR AGRÉGÉ AT THE VAL-DE-GRÂCE.

DURING the war, gas gangrene was the subject of numerous works. Researches have finally culminated in a new pathogenic conception of this wound complication.

*The Position attained in Pathogeny and Serotherapy.*

At the present moment, indeed, gas gangrene is not considered a malady always identical with itself and having its specific microbe, but as a toxinfection with gangrenous and gaseous manifestations, which several anaerobic germs are capable of producing. Amongst these germs three are almost constantly met with, either the *Vibrion septique* or the *B. bellonensis* (or else *B. œdematiens*, very nearly related if not identical), or else the *B. perfringens*; two of these germs are often associated in the same lesion.

At the same time as the ætiology of this affection was being made clear, therapeutic serums were being prepared, an antiseptique serum, an antibellonensis serum (and an anticœdematiens serum), and an antiperfringens serum.

It seemed, then, that we were in possession of an active serum against the pathogenic germ in a case of gas gangrene. And this is undoubtedly the case, provided that it is known which is the pathogenic germ conditioning the particular case of gangrene. We have three serums at disposal, but which is the appropriate one to any particular wound? Is the gangrene caused by the *Vibrion septique*, or *B. perfringens*, or *B. bellonensis*? It is here that the importance of the diagnosis—of the rapid diagnosis—of the bacteriological form of a case of gangrene lies.

*Early Bacteriological Diagnosis.*

The necessity of knowing promptly which is the pathogenic germ in each case of gaseous toxinfection continues to exist in spite of attempts to get round the difficulty.

It was at first possible to believe that the aspect of the lesion and its clinical behaviour varied according to the nature of the toxinfectious agent. It certainly seems that the œdematous forms of the gangrene (the type of which is white erysipelas) are due to the *B. bellonensis*, but purely œdematous forms are rare. Mixed cases with œdema and gas are very much more common, and it is then impossible to know which is the pathogenic germ when there is association. Slight clinical variations are unable to enlighten serotherapy.

It was next believed that in this bacteriological uncertainty it was best to inject a mixture of the three serums into the patient. This is certainly a rational procedure, but the importance of an early bacteriological diagnosis is none the less urgent. For it is obviously preferable to inject nothing but the specific active serum, the dose of which may then be increased and its therapeutic power raised accordingly. For this purpose an early bacteriological diagnosis is again necessary. How to obtain it?

The usual bacteriological methods cannot, as a rule, provide a diagnosis early enough. Quite apart from the time required by the isolation and identification of the anaerobic germs that are found, there are special reasons which often make the researches in gas gangrene particularly long.

To begin with, there is the circumstance that the growth on culture media of the toxic species (*Vibrion septique*, *B. bellonensis*) is often very scanty. Now, in order to separate the microbes as a preliminary to their identification it is necessary to start with a very small quantity of the pathological product. Hence the necessity of numerous subcultures and of multiplying the examinations for fear of error.

Further, we know now that the association of the germs of gas gangrene in the same wound is very common, so much so that repeated investigation is unavoidable before it can be said that only a single species of microbe is the cause.

Lastly, we know that *B. perfringens* is very frequently found in war wounds, whilst many of these wounds present no signs at all of gangrenous or gaseous infection. So much so that the presence of *B. perfringens* does not of itself imply that this germ has played an active part in the development of the infection. We must, therefore, ascertain its power by experimental investigations, a further cause of delay.

The classic methods cannot then provide that prompt answer which alone can guide the serotherapeutic treatment of an infection which runs its course in a few days. We were therefore led to seek for another way, and it seems that the method of diagnosis by means of the use of specific serums gives every satisfaction.

*Principle of Method of Diagnosis.*

Let us first give the theoretic basis of the method as we have used it in conjunction with Sacquépée.[1]

The injection of a specific serum confers on the animal an efficacious, specific protection against the corresponding infection or toxinfection. Now, an emulsion of fragments of a wound complicated with gas gangrene, when injected into the guinea-pig, provokes in that animal manifestations of that affection, because this emulsion, as a matter of fact, contains one of the three germs, *V. septique*, *B. bellonensis*, *B. perfringens*. But which of these three?

To ascertain this it is enough to inject this emulsion, which is pathogenic for the control, into three animals which have received, either beforehand or simultaneously, an injection of antiseptique serum, antibellonensis serum, and antiperfringens serum respectively. It is then seen that two of these animals as well as the control develop signs of gas gangrene and die, whilst the third remains "protected." This is due to the circumstance that the experimental infection has been limited by the protective serum, and the nature of the serum indicates the nature of the corresponding germ which is the agent of the gas gangrene in that particular case.

Moreover, it may happen that the infection is mixed, and it is precisely by this method that this fact has been established. The experiment does not lose any of its precise character on increasing the number of animals protected by mixed injections of serums.

*A Criticism Anticipated.*

We shall describe the practical details to be adopted, but we must first anticipate a criticism.

The guinea-pig which receives a rich emulsion of a product of gas gangrene really receives a highly polymicrobic emulsion. Very numerous germs are, indeed, found in this liquid: streptococci, pneumobacilli, *B. proteus*, *B. tetani*. A priori, then, one might ask oneself whether the pathogenic action of these germs—indifferent as they are to gas gangrene—may not disturb the result of the experiment.

But there proves to be nothing in this objection. In the case of the guinea-pig neither the streptococcus, nor the proteus, nor the pneumobacillus, nor the tetanus bacillus produces any appreciable action within 24 or 48 hours, and in consequence they do not produce any morbid phenomena capable of simulating the development of gas gangrene. If, on the contrary, this polymicrobic product contains the agents of the gas gangrene, everything proceeds just as if a pure culture of one or two of these three species had alone been inoculated: appearance within the very first hours of a rapidly spreading local œdema, very marked, and growing with light crepitation from the twelfth hour, later injury to the general state and death towards the twenty-fourth hour, at latest in 36 or 48 hours. It will be noticed at the same time that the part played by *B. perfringens* in each particular case is cleared up. If the *B. perfringens* played no part at all in the gaseous infection it has no pathogenic effect; in the contrary case, it is observed that only the animals protected by the perfringens serum remain unhurt.

*Practical Details of Methods.*

Such is in principle the method of diagnosis by means of specific serums as applied to gas gangrene. Let us now consider the practical details of its working.

The emulsion must first be prepared, and the method is not immaterial. The favourite seat of the pathogenic

[1] Sacquépée et de Lavergne, Bulletins et Mémoires de la Société médicale des hôpitaux de Paris, Dec. 6th, 1918.

germs being the muscular tissue, this should be taken in preference to serum or cellular tissue. Moreover, in order to avoid the associated common-place germs the muscular fragment must be removed at the limit of the seat of infection. As soon as possible after removal the muscular fragment is teased in about 10 c.cm. of physiological saline. It is filtered through cotton, and the liquid is then divided into five test-tubes at the rate of 5 c.cm. per tube.

How are now the guinea-pigs to be "protected"? An injection of serum preliminary to the injection of the emulsion would retard the experiment. It is therefore preferable to inoculate serum and emulsion simultaneously after a brief preliminary contact. We take, therefore, the five tubes, each containing 1 c.cm. of emulsion. Tube No. 1 is left as it is; it will be inoculated into the control animal. To tube No. 2 we add 1 c.cm. of the antibellonensis serum, to tube No. 3 1 c.cm. of the antiseptique serum, to No. 4 tube 1 c.cm. of the antiperfringens serum, and to No. 5 1 c.cm. of each of the three serums. The whole is heated in the thermostat to 37° for 30 minutes. The contents of each tube are then inoculated into a guinea-pig belonging to a series of approximately equivalent weights.

*Results.*

Diagnosis is usually fairly clear after 12 hours, and after 24 hours there is no doubt at all.

In 60 per cent. of cases the result is schematic. By the twenty-fourth hour three animals are dead or dying—viz., the control and two animals inoculated with a single one of the three serums. Two are alive and vigorous, without even appreciable local lesions—viz., the guinea-pig which has received the three serums and one of those which has received a single serum. The nature of this serum indicates the nature of the pathogenic agent in the particular case of gangrene. The same serum which has protected the guinea-pig will protect the patient. Moreover, the results patent at the twenty-fourth hour are very often clear already at the twelfth, and seroterapy could have been put on the right lines from that time on.

In other cases (35 per cent.) the results are at first sight less schematic. The control dies, one of the three animals which have received a single one of the three serums dies also, and the two others survive or die slowly whilst presenting important local lesions, such as œdema, very often extensive, and gaseous crepitation. Finally, the guinea-pig protected by the three serums does not only not succumb, but does not even present any marked local phenomena.

These results must be interpreted as a case of double infection. The animal protected by the three serums has remained unharmed; two of the guinea-pigs with a single serum, having presented marked local phenomena, are only protected against one of the two infections; and the guinea-pig which is dead was not in any way protected by the serum which it had received. We have, therefore, all the elements wanted to recognise the germs associated in each case.

In 4 per cent. of cases all the animals succumb, not only the control, not only the animals protected by a single serum, but even the animal protected by the simultaneous injection of the three serums. In such cases, the rareness of which is apparent, neither the *V. septique* nor the *B. bellonensis* nor the *B. perfringens* is the cause. The gas gangrene is the work either of atypical *V. septique* or of *B. sporogenes* or some other aberrant germ.

*Advantages of the Method.*

The results obtained by this method of diagnosis by means of serums are parallel to those obtained by the usual bacteriological methods of separation and identification of germs. It retains the precious advantage of being infinitely more rapid and of replacing the blind method of serotherapeutic injection of the three serums by a method of seropathy in which only the useful serum or serums are injected, allowing the dose to be increased.

This method of diagnosis possesses another advantage. It gives the doctor confidence in curative serotherapy. By proving how often the guinea-pigs are efficaciously "protected" this test in medical experiment demonstrates all the benefits which the injection of the serum will confer on a patient attacked by the same infection as the guinea-pig.

*Previous Contributions.*

The French Supplement to THE LANCET—under the Editorial Direction of Professor Charles Achard, Professor of Clinical Medicine in the University of Paris; and Dr. Charles Flandin, D.S.O., Chef de Clinique à la Faculté de Paris—has appeared on the dates given in the following list, which sets out the titles and authors of the contributions:—

Sept. 21st, 1918: (1) The Microbic Diversity of the Enteric Fevers, by Professor Achard. (2) Post-Typhoid Atony of the Cæcum, by Maurice Loeper, Professor of the Faculty of Medicine and Physician to the Paris Hospitals.

Oct. 19th, 1918: (1) What the War has Taught Us about Tetanus, by Louis Bazy. (2) Tetanus Consecutive to Superficial Wounds and to Trench Foot: Treatment and Prevention, by Professor Raymond, Médecin Principal de 2me Classe.

Nov. 30th, 1918: (1) General Review of French Cardio-Pathology during the War, by Ch. Laubry, Physician to the Paris Hospitals, Médecin Major de 2me Classe. (2) Methods of Estimating Augmentation in Depth of Volume of Left Ventricle, by Dr. Bordet, Director of the Radiological Laboratory of the Centre of Cardiology of Professor Vaquez, Hôpital St. Antoine.

Jan. 11th, 1919: (1) Gunshot Concussion of the Spinal Cord, by Henri Claude, Professor in the Paris Faculty of Medicine, Physician to the Paris Hospitals; and Jean Lhermitte, formerly Chef de Clinique in the Paris Faculty of Medicine. (2) Contribution to the Study of the Manifestations of Emotional Shock on the Battlefield, by Cl. Vincent, Physician to the Paris Hospitals, formerly Medical Officer to the 46th and 98th R.I. and to the 44th B.C.P.

March 1st, 1919: The Surgical Complications following Exanthematic Typhus, by Dr. Paul Moure and Dr. Etienne Sorrel, Prosectors to the Faculty of Medicine, Paris, Médecins Aide-Majors de 1er Classe, Surgeons to the French Hospital at Jassy.

April 5th, 1919: (1) Nervous Complications of Exanthematic Typhus, by A. Devaux, formerly Interne of the Paris Hospitals, Médecin-Major de 2me Classe. (2) Note on the Epidemic Diseases Observed in Rumania during the Campaign of 1916-17, by Dr. Henri Vuillet, late Interne of the Paris Hospitals.

May 3rd, 1919: (1) Malaria During the War, by G. Paisseau, Médecin-Major de 2me Classe. (2) Distribution of Soldiers, Temporarily Unfit through Malaria, in Agricultural Colonies, by Professor E. Jeanselme. (3) Studies on Renal Function in Chronic Nephritis, thesis by Pasteur Vallery-Radot, reviewed by Professor Charles Achard.

June 21st, 1919: (1) Recent Work on Cerebro-spinal Fever, by C. Dopter, Professor, Val-de-Grâce, Médecin-Chef to an Infantry Division. (2) Meningococcal Rheumatism and Arthritis, by Dr. Paul Sainton, Physician to the Paris Hospitals.

Aug. 23rd, 1919: Radiological Examination of Pseudarthroses before and after Operations of Bony Grafts, by Paul Aubourg, Professor Agrégé, Cuneo's Laboratory for Radiology. (Centre for Surgery of Bones, Hospital 75, Cannes.)

Sept. 27th, 1919: (1) Dysidrosis: its Parasitic Nature, by J. Darier, Physician at the Hospital of St. Louis; Member of the Academy of Medicine. (2) The Contagiousness of Favus in Man, by R. Sabouraud.

Nov. 8th, 1919: (1) Secondary Echinococcus, by F. Dévé, Professor at the School of Medicine, Rouen. (2) A Case of Peritoneal Echinococcus, by Charles Flandin, Chef de Clinique Médicale at the Faculty of Medicine in Paris.

Dec. 20th, 1919: French Work on Ictero-Hæmorrhagic Spirochætosis, by Marcel Garnier, Physician at the Laribosière Hospital, Paris.

Jan. 31st, 1920: (1) Some Appliances for the Examination of the Nervous and Muscular Systems, by Dr. Jean Camus, Professeur Agrégé of the Medical Faculty in Paris; Médecin des Hôpitaux. (2) The Laws of Tremor, by Dr. Léon Binet, Interne des Hôpitaux, Paris.

Aug. 7th, 1920: (1) Serum Treatment of Hæmophilia, by P. Emile Weil, Physician to the Hôpital Tenon. (2) Coagulation of the Blood: A Study of the Anti-coagulant Action of Sodium Citrate and of the Part Played by Calcium in the Blood. By Marcel Bloch, Chef de Laboratoire in the Faculty of Medicine, Paris.

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THE LANCET.

*LONDON: SATURDAY, SEPTEMBER 18, 1920.*

## Epidemics of Eastern Europe.

Four years ago, in an introductory note to PRINZING'S "Epidemics resulting from Wars," the director of the Carnegie Endowment (Division of Economics and History) stated that the most serious human cost of war is not the losses on the field, nor even the losses from disease in the armies, but the losses from epidemics disseminated among the civil populations. That truth is being increasingly brought home to us. Dr. L. HADEN GUEST, in the first of the communications regarding his recent observations in Soviet Russia, which appeared in THE LANCET of Sept. 4th, showed clearly that all the facts which had come under his notice confirmed what had been suspected from previous evidence regarding the prevalence of typhus and relapsing fever. During the last two winters the whole of that country has been swept from end to end by these diseases, and all indications point unmistakably to their recurrence on a formidable epidemic scale in Russia during the winter which is now approaching. In our present issue he refers also to cholera, which made its appearance last year in Astrakhan and on the shores of the Caspian Sea. In former years the Volga and other great waterways of European Russia played a conspicuous part in the spread of epidemic cholera through that country and from Russia to Europe. However much credit we may give to the energy and devotion of the medical service which is being maintained by the Government of the Soviets, it is impossible to disregard the consideration that at no time probably in recent history have Russian cities been so vulnerable to this and other epidemic diseases which are carried by polluted water and nourished by every kind of insanitary circumstance. Dr. GUEST'S account of the town of Astrakhan is eloquent in this respect. Nor is the tale of formidable epidemic disease in this part of the world restricted to typhus, relapsing fever, and cholera: small-pox, always endemic in Russia, and now widely prevalent, has also to be reckoned with.

It is a good habit, on hearing of a catastrophe or impending calamity in which one is interested, to ask what is to be done about it. On the purely insular view the United Kingdom is not much concerned. We can keep these diseases out, or round up any occasional imported cases, if our public health service exercises sufficient extra vigilance, and this is certain to be forthcoming. But obviously on this matter Britain cannot afford to be insular. Even if questions of humanity are set aside, and any amelioration of affairs in Soviet Russia by outside action is dismissed as impracticable in present political circumstances, there remains the feasible and practical policy of effective epidemic prevention by international action in the border States, especially Poland, Lithuania, and Galicia. The case for this policy has often been stated, and it has recently been set out forcibly and eloquently in the letter which Mr. A. J. BALFOUR, on behalf of the Council of the League of Nations, has addressed to the civilised Governments of the world. These border States are the centre of the unsettlement of Europe at the present time; we are now fortunately within sight of peace, which should lead in these lands to that re-establishment of industry and normal conditions of life which, in view of their political and geographical position, is so vital for the whole of the world. The first condition for such settlement to be accomplished is international action, which will strengthen the resources of these States to deal with the epidemic diseases by which, from their relations with Russia, they are perpetually menaced. The most practical question at the moment is the launching of the League of Nations scheme for action in Poland and elsewhere, and with it the direction and coördination of the various offers of help in money and material which have been made by voluntary organisations, including the Red Cross agencies, which are actively engaged in preparing to take their share in the scheme. The developments of this programme are being watched with considerable anxiety by the well-wishers of the League of Nations. The Council of the League have thoroughly explored the position, with the aid of some of the best-known epidemiologists in the world; they have a reasonable and economical programme, and have appointed commissioners, but the actual work cannot proceed until they have obtained money guarantees from the different nations, which so far have not materialised, except in the case of a few countries, including Great Britain and Canada. The future of the matter may well prove, in the parlance of the day, an "acid test" of the reality of the League as a family of nations, ready to act for the common good and to protect members of the family who are threatened by disaster.

Limitation of the spread of these epidemic diseases in the border States seems, in fact, to be the one immediately feasible protective measure which can now be applied with prospects of immediate good result. By the side of it, obviously, should go every effort which, through the League of Nations or by individual sacrifice, can be made to improve the appalling epidemic conditions in Russia itself: a matter in which progress, first and last, must depend on the Government of that country. We are sure that no bona fide appeal from the Soviet Government to the nations of the world for help in organising a sanitary service, such as Dr. GUEST suggests in this week's article, would pass unheeded, and we are equally sure that practical hygienists would be found with the courage and ability necessary to undertake the formidable task involved, if satisfied that they are asked to work for a Government which will not exploit their services for its own ends, but wishes to use and support them for the health of its people. Obviously, however, we cannot at the best expect that measures for prevention of typhus, cholera, or other major epidemics in Soviet Russia can be made really effective in a year or two, so as to influence materially the immediate effect, and the extension beyond Soviet Russia, of the appalling conditions on which Dr. GUEST has supplied us with such recent and valuable evidence.

## Varicose Veins.

THE September number of *Medical Science* contains an interesting review of the various methods of treating varicose veins of the lower limbs. The subject has not recently received much attention here, and it is noteworthy that nearly all the authors and papers quoted are of continental origin. This is not owing to lack of material, for the condition is as common in this country as in any other. Probably it is due rather to the fact that hospital accommodation is insufficient to admit of the treatment on a large scale of an ailment which is usually regarded as of minor importance. Yet the total amount of disability and suffering due to varicose veins must be enormous. Patients with this condition can be divided into two main classes: (1) Younger people with bunches of varicosities on the thigh or calf, usually along the course of the internal saphenous vein; (2) elderly people with œdematous legs and one or more intractable varicose ulcers. Patients of the first class are commonly told to wear a crêpe bandage or elastic stocking, neither of which is an efficient palliative. Operations are not in favour because they are believed usually to fail, and this is no doubt true if surgical interference be not exceedingly thorough. The procedure originally recommended by TRENDELENBURG—namely, ligature of the saphenous vein—is not enough. All the tributaries of the vein at the saphenous opening must be ligatured and three inches of vein removed. Even then recurrence may take place owing to the communications on the back of the thigh between the internal and external saphenous vessels. To overcome this an incision should be made over the upper part of the inner head of the gastrocnemius, through which lengths of both veins can be excised together with their communications. This operation can be successfully applied to the less severe cases, but it entails keeping the patient in bed for ten days, in itself a serious drawback. Use has accordingly been made in Germany during the war of a method which, it is claimed, combines efficiency with rapidity. This depends on the injection of a 1 per cent. solution of perchloride of mercury into the lumen of the vein at various points, as a result of which thrombosis takes place almost immediately at the sites of injection. The procedure is painless if care be taken that none of the solution leaks into the subcutaneous tissue, and it is stated that there is no risk from embolism. Should collateral veins become dilated afterwards they can be injected in the same way. Various operative procedures for the severer cases have been devised, several of which depend upon the avulsion of the vein by means of appliances passed along their lumina through incisions at either end, but such methods do not seem to be, surgically speaking, so sound as a thorough excision, even though this has to be rather extensive. The incisions are made, if possible, through sound skin, and, if need be, are extended along the whole length of the leg.

The second class of patients includes the numerous elderly women who display swollen and discoloured legs, week in week out, to despairing house surgeons in the out-patient departments of all large hospitals. With prolonged treatment the ulcers can be made to heal, but the underlying causes—varicose veins and long hours of standing in the course of domestic duties—are still present and the ulcers soon recur. Grafting from the skin at the edges of the ulcer has recently been recommended, but the artifice does not deal with the underlying cause. A more thorough method involves a spiral incision through the skin down to the deep fascia, beginning at the saphenous opening and ending behind the internal malleolus. The spiral thus consists of two complete turns. The incision must divide even the small transparent veins lying on the fascia and when the bleeding points, which are not numerous, have been ligatured the wound can be sutured. A bandage should be worn for a period after the operation. This procedure has the same objection as most others, that the patient has to remain some days in bed; but there can be no short and easy road to success in so intractable a condition, and the longest cut may prove to be the shortest in the end.

## Iatro-Mathematics.

THE whole of the original articles published in a recent number of the principal Swiss medical journal[1] deal with the application of the calculus of probabilities to the elucidation of medical problems. Professor H. ZANGGER, of Zurich, contributes a brief introductory commendation, Dr. H. WEYL discusses some physical applications of the statistical method, Dr. (phil.) E. HAEMIG illustrates the statistical technique of the famous psychologist LIPPS, Professor L. MICHAUD furnishes some applications of the method to clinical data, and Professor ZANGGER concludes with some non-arithmetical examples. To the reader familiar with the writings of v. KRIES, EDGEWORTH, KARL PEARSON, BOREL, and POINCARÉ, the epistemological discussions will not reveal any fresh point of view, while the mathematical or arithmetical technique of LIPPS, not the best available at the time it was devised, has long been superseded by a far more powerful calculus the development of which we chiefly owe to Professor PEARSON and his pupils. This is not, however, to say that the articles do not contain much which all members of our faculty could read with profit and, in any event, the mere fact of publication is significant, for it is probably the first occasion on which an issue of a leading medical journal has been mainly devoted to a discussion of such topics. In this country signs have accumulated that the importance to scientific medicine of the intellectual processes subsumed under such vague headings as Mathematical Statistics or the Theory of Probability are becoming realised by the leaders of the profession. The two departments of State most directly concerned with medical research—the Ministry of Health and the Medical Research Council—employ trained medical statisticians as whole-time officers, and last year the Royal Society of Medicine honoured both statistical science and themselves by conferring the titular Fellowship upon Professor PEARSON. It may not, therefore, be inopportune briefly to indicate reasons why this rapprochement is to be welcomed in the interests of medical knowledge.

If one considers the earliest monument of scientific medicine, the body of writings bearing the name of HIPPOCRATES, the conflict of two opposing intellectual principles is discerned. In the so-called "genuine" works of HIPPOCRATES himself, particularly in the first and third *Epidemics*, and the essay on "Air, Water, and Places," we see

[1] Schweizerische Medizinische Wochenschrift, August 19th, 1920.

employed the principle which has come to be associated with the name of BACON—viz., that of assembling particular instances, of classifying them and using them as a basis of induction. But we also meet with a system of purely deductive reasoning, of inferences drawn from first principles grounded, not upon experience, but upon loose analogies. In the hands of GALEN, who has at least as important a place in the development of medicine as that of ST. PAUL in the evolution of Christianity, the teaching of HIPPOCRATES suffered a transformation. It is true that GALEN, particularly in his doctrine of temperaments, and in the discussion of the factors of what we should call epidemic diseases in his less-known work on the "Differentiæ of Fevers," developed a notation appropriate for the orderly assembling of such data as are specified in the Hippocratic books. But it is also true that he devoted the major part of his labours to a refinement of the strictly deductive method which resulted in the formulation of a quasi-infallible system the influence of which upon the minds of his successors was almost wholly bad. It is of interest to recall that the great mathematical ability of the Greeks was directed to those branches of mathematics which are most remote from the application of quantitative reasoning to aggregates of particulars such as were collected by HIPPOCRATES, that the science of mathematical probability is only a few centuries old. When, after the revival of science, a return was made to the Hippocratic standpoint, pre-eminently by SYDENHAM, it unfortunately happened that the protagonist separated himself from the good as well as from the bad schools of his age. Although SYDENHAM resumed the Hippocratic method and modelled his chief work on the *Epidemics*, he, no more than the Greek physician, grasped the true significance of the quantitative principle. The subsequent history of SYDENHAM'S ideas and of those of an obscure non-medical contemporary, the London draper JOHN GRAUNT, is full of instruction. Intellectually, there was no comparison between the two men, yet if we inquire whose work conferred more benefit upon medical science, there can be but one answer. That of GRAUNT was far more fruitful; to it we owe, directly, our modern systems of medical and vital statistics, and indirectly, through HALLEY, the scientific development of life assurance. The less learned and less philosophically-minded man realised what the other did not realise—that to draw profit from aggregated particulars they must be quantified and ultimately brought to the test of arithmetic. The historical reason for the slowness of the rapprochement of mathematics and medicine is that the most gifted minds (with rare exceptions such as that of SYDENHAM) were occupied in amending another fault of ancient medicine. GALEN'S specification of the temperamental and procatarctic causes of diseases was, and is, of value, while profit can still be drawn from the climatological and meteorological observations of the Greeks. But ancient medicine contributed nothing of value to our intimate knowledge of specific causes. No satisfactory doctrine of *contagium vivum* is older than FRACASTORIUS, and the earlier classification of diseases were symptomatic. Of the simplification and precision, not to speak of the therapeutic and prophylactic advantages, which the researches of experimental pathologists and bacteriologists imported into medicine it is needless to speak. On the other hand, a few able physicians, such as BORELLI, BELLINI, and BAGLIVI, or our countrymen, FREIND, COLE, and PITCAIRN, who were attracted by mathematical methods, did not pursue mathematical lines which were apt to lead to the discovery of important truths.

The incompleteness of our outfit owing to the neglect of mathematical methods was not a serious practical inconvenience so long as the supply of important discoveries through the use of other tools was abundant. We could not even wish that the great pathological anatomists of the eighteenth and early nineteenth centuries and the great experimental pathologists and bacteriologists of more recent times had devoted themselves to other tasks. But it is becoming every day clearer that the methods they introduced, although of priceless value, are not omnipotent. It is now plain that the most exact specification of the materies morbi of such a disease as pulmonary tuberculosis, the most sedulous examination of its channels of entrance to the body and of its extra-corporeal distribution leaves much unexplained. We note the disparate incidence of the disease upon different occupations not subject to specific hazards, wide variations between class and class, and between nation and nation, and recall the words of GALEN, "No cause can be efficient without an aptitude of the body ..... the chief factor in the production of disease is the preparation of the body which will suffer it." But so soon as this aspect is faced, so soon as we envisage the problem of innate or acquired predisposition, the need of the mathematical tool is realised. We enter the region of probability, we have to render an account of a complex of inextricably mingled cause-groups and to deal with average results. Within a narrower circle, that of clinical medicine, the same need arises. Of those infected with the same specific organism, perhaps exhibiting the same physical signs and symptoms, some recover and some die. Or again upon a group of cases ostensibly *in pari materia* the same therapeutic agent exerts different effects. The causes of these divergences are multifold and cannot be submitted to experimental control in isolation. We have a problem comparable to that of the tossing of a penny. The direct evaluation of the force of the throw, of the resistance of the air, of the impact is impossible, we must fall back upon the evaluation of average results and their laws of distribution. The students of molecular physics have for similar reasons had recourse to the methods of mathematical probability, as Dr. WEYL points out, and it is now being appreciated that to medicine a similar application is imperative.

At present the rapprochement of medicine and mathematics is incomplete; our generation will not see many iatro-mathematicians, using better methods and aiming at more attainable ends than the iatro-mathematicians of 200 years ago; mistakes will be made both in choice of method and of material. But the rapprochement will eventually become a firm alliance and lead to the conquest of new territories. For these reasons we welcome the testimony of a changing public opinion rendered by our Swiss contemporary.

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ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—At the monthly meeting of the Faculty, held on Sept. 6th, Dr. John Brownlee, director of statistics, Medical Research Council, was admitted as an Honorary Fellow, and Dr. B. W. H. Fergus, of South Africa, was admitted (after examination) as an ordinary Fellow of Faculty.

# Annotations.

"Ne quid nimis."

## THE RELIEF OF DISABLEMENT: A DEBT OF HONOUR.

AT the Mansion House last week Dr. Macnamara, Minister of Labour, spoke of the approach to a final stage in the reabsorption of ex-Service men into civil life. Five million fighting men and 200,000 officers have been reinstated, and there remain some 150,000 men who still lack occupation. At least 18,000 of these, Dr. Macnamara said, are disabled. Disability is an elastic term. Scheduled disability, as the medical man knows well, does not cover all the maladjustments to the daily round which prevent a man who has been taken away from his peaceful occupation and exposed to the stress and strain of war from readily returning again into industrial life. Dr. R. Fortescue Fox, in his illuminating letter which appeared in our columns a fortnight ago, adduced even from official utterances a larger total of war disablement than that admitted by Dr. Macnamara at the Mansion House. As a result of his experience at the first treatment and training centre opened in this country Dr. Fox became satisfied that nearly 20 per cent. of the men passing through his hands must be placed in a special category as subnormal, which is to say that while possessing a good capacity for work they are at present unfit for ordinary conditions of industry. Accepting this basis, there must be at least 25,000 of the class in the country. The proportion of subnormal men likely to find their permanent vocation on the land is not very high, the majority having neither the physical strength nor the inclination for agriculture or horticulture. Should land-work alone be provided for men unable to work in towns it will mean that all over the country large numbers will either be doing nothing or going into land-work or town life only to break down and come out again—a cat-and-mouse existence. They are not agriculturists; they cannot be town workers. What is to be done with them?

The problems involved in the provision of permanent employment for disabled men are complex and difficult, demanding for their effective solution sympathetic study from social, economic, and medical standpoints. Medical considerations must loom large in any scheme which is put forward; the debt of honour, in fact, rests heavily on the medical profession, for it alone is in a position to liquidate it completely. The assessment of fitness for work and of the nature and degree of work suitable to the individual, advice and guidance as to the conditions under which occupation is feasible without risk, and even the form of employment most applicable to the particular disablement—these are definitely medical problems. One of the points of reference to the Select Committee on Pensions appointed last May was to inquire into and report upon the position as to employment and training of ex-Service men. White Paper No. 185, recently issued, defines the following classes:—

(1) Men requiring treatment such as would interfere with regular attendance at a continuous course of training on ordinary industrial lines.

(2) Men who are likely to break down or who have broken down in training or employment under ordinary industrial conditions.

(3) Men whose condition necessitates concurrent treatment and training in a convalescent centre.

(4) Men whose disability is such as to make it impossible or undesirable for them to be trained or employed in association with other workmen.

Some medical men may find an administrative classification such as this not very easy to interpret, and apparently the Select Committee recognised the difficulty, for it points out that concurrent treatment and training may be given either in convalescent centres or in orthopædic, neurasthenic, and other hospitals, where classification can then be carried out. But the accommodation at present available is still lamentably insufficient, and the provision of further accommodation is urgently recommended by the Select Committee, which regards such centres for treatment and training as of the greatest value if established on efficient and practical lines.

Only those who have been closely in touch with work among military convalescents can have any idea of its many-sidedness. In the current issue of the *Journal of the R.A.M.C.* Dr. L. Graham Brown shows that the convalescent depôt in France meant something more than re-creation or recuperation of the disabled man's physical powers; it meant what is of equal, if not greater, importance—the re-creation of his mental and moral character by placing him in an environment where spiritual influences can work their effect. Those to whom this may seem a large claim should study the rapid and inevitable deterioration seen in the disabled man who is not promptly re-absorbed into communal life. The streets of London and of other large cities in this country, and doubtless of other countries, are full of deplorable saprophytes, who are not likely to get less numerous as time goes on. Dr. Brown, whilst not undervaluing the influence of chaplains, of the Y.M.C.A., or of lectures by commandants, ascribes the curative atmosphere of the depôt chiefly to the competitive spirit built up throughout the whole work and play of the depôt by the officers in charge of it. Nothing has been shown, or is now likely to be shown, able to take the place of communal life lived at the highest level applicable to the particular disablement. An analogy may not unfairly be drawn with the admitted success of communities, many of them now long established, where the impairment is of a different character. Every county mental hospital forms a self-supporting and self-governing State to a degree which needs to be seen to be realised. Some colonies of mental subnormals make their own bread, grow their own wheat, manufacture their own ice for refrigerators in which is stored meat derived from their own farm. The hospital farm includes cattle, poultry, pigs, orchard, kitchen and flower gardens, all cared for by patients under expert supervision. There are shops for carpenters, for plumbers, for cobblers, for tailors, and many others. The hospital chapel is the size of a small village church, and a large theatre, dancing- and billiard-rooms, playing-fields, and tennis-courts complete the arrangements for recreation. The cases are not quite parallel, for in the disabled community provision must be abundantly made for wives and children, but nevertheless the county mental hospital might suggest the nucleus of a permanent centre for war disablement. The problems in each case are essentially medical, and the administrator requires a medical training in addition to his other gifts. Since it is quite impossible to assess a man's capacity for work under outside conditions before he has been trained or tried, admissions to such an institution would include a majority of men who would subsequently be able to leave and fill their place in ordinary life. The colony would retain as permanent inmates the second of the four classes mentioned in the White Paper.

## THE CARE OF MENTAL DISEASE IN SCOTLAND.

WE learn from the sixth annual report of the General Board of Control for Scotland that on Jan. 1st, 1920, there were 17,432 patients on the Board's register, while on Jan. 1st, 1916, there were 18,842 patients, showing a fall of 1410. Between 1916 and 1917 there was a decrease of 181; between 1917 and 1918 a decrease of 536; between 1918 and 1919 a decrease of 524; and between 1919 and 1920 a decrease of 169. This last figure perhaps serves as an indication that the influences which produced a marked decline, especially in the number of pauper lunatics during the period of the war, are beginning to subside. The total number of patients admitted to establishments (excluding transferred patients) during 1919 was 3619, which is 226 more than in the previous year, 482 more than in 1917, 184 more than in 1916, 12 less than in 1915, and 63 more than the average for the quinquenniad 1910–14. Of private patients there were discharged recovered during 1919, 318, which is 66 more than the number in the preceding year and 105 above the average

of the five years 1910–14. The number of pauper patients discharged recovered was 955, which is 145 more than in the preceding year and 178 less than the average for the five years 1910–14. The number of private patients discharged unrecovered, excluding those transferred during 1919, was 187, which is 45 more than last year and 56 more than the average of the five years 1910–14. The number of pauper patients discharged unrecovered was 282, which is 26 less than the number so discharged in the preceding year, and is 97 less than the average for the five years 1910–14. The number of private patients who died during 1920 was 314, which is 36 less than in 1918 and 130 more than the average of the five years 1910–14. The number of pauper patients who died was 1522, which is 374 less than in 1918 and 258 above the average of the five years 1910–14. There is a somewhat remarkable fall in the admission to care in private dwellings under the boarding-out system obtaining in Scotland. The Board of Control attributes this to the general decrease in the number of pauper lunatics, to the disorganisation in the arrangements for placing patients caused by the war, to the improved financial condition of many of those who formerly received patients, and to the lack of housing accommodation. The cost of maintenance of patients per head is shown by the following interesting figures. In asylums the average weekly cost was 14*s.* 7*d.*; in the licensed wards of poor-houses, 13*s.* 8*d.*; and in private dwellings, 9*s.* 7*d.*

## PRIMARY ACTINOMYCOSIS OF THE TONGUE.

PRIMARY actinomycosis of the tongue is fairly common in cattle, but is an infrequent occurrence in the human subject. Professor R. Kockel,[1] of Leipzig, records a case in a man aged 40, from whose tongue a hard superficial tumour, the size of a bean, had been removed. On microscopical examination the tumour at first sight resembled a rapidly growing sarcoma, as it consisted of a tissue rich in cells which had penetrated between the muscle fibres of the tongue causing pressure atrophy; but after serial sections had been made a central purulent focus was discovered in the middle of which a small foreign body was seen which was apparently a piece of wood surrounded by actinomycotic granules. The explanation given of the localisation of the lesion is that the patient, in order to break himself of the practice of excessive cigarette smoking, had been in the habit of chewing a wooden tooth-pick, a piece of which in all probability had become broken off and penetrated the tongue. Professor Kockel remarks that the case is of interest because wooden tooth-picks, like matches, have hitherto enjoyed the reputation of being germ-free. The case also shows that actinomycosis of the tongue in man, as in cattle, may appear in the form of a relatively benign new growth and does not always show a tendency to rapid dissemination.

## THE PROBLEM OF DENTAL DISEASE.

IN the *British Dental Journal* for August 16th Dr. James Wheatley, the county medical officer of health for Shropshire, makes a valuable contribution to the subject of dental caries. Dr. W. E. N. Dunn called attention to this article in a letter last week (p. 576). For several years Dr. Wheatley has been giving, in his yearly reports, data with regard to the incidence of caries in the area under his supervision. The figures he has now furnished are based on the examination of 37,527 children before the war and 10,593 children since the war. These figures show remarkable improvement in children now at the age-period of 5 years; before the war only 5 per cent. of the children in this age-group were free from caries, whereas no less than 44·4 per cent. of post-war children showed no decay. This great improvement he attributes largely to the restriction and modification of food during the war as it affected especially sugar, bread, and milk. Children of 5 have, of course, grown up into these conditions. In the case of sugar the consumption was lessened and sweets almost disappeared for a period. The bread was modified by the addition of so-called offal to the flour and by the prohibition of the sale of new bread. This, together with the necessity of eating crusts owing to the shortness of supply in general, led to an increase in the practice of mastication. In a small measure Dr. Wheatley considers the improvement may be due to the campaign he started against dental caries, but the chief point of interest is the confirmation by figures of the belief that the cause of caries lies in the food and not in assumed constitutional conditions. In dental caries, Dr. Wheatley remarks:—

"We are dealing not with a disease which we might alleviate or to some extent prevent, but with a most powerful cause of disease and with a condition which is liable to aggravate every other disease. We have an opportunity of removing a cause of disease such as does not present itself in any other branch of preventive medicine."

A national scheme for the prevention of dental caries is badly needed, and there is already a sufficient basis of unanimity on essentials for such a scheme to be a success; but if it is to yield the quickest and best results it requires the whole-hearted coöperation of the medical profession.

## THE FRACTIONAL TEST-MEAL IN RELATION TO GASTRIC FUNCTION.

THE use of a test-meal for the diagnosis of gastric diseases is well known, and considerable interest, at times lighting up into controversy, has been aroused over this subject. There is little doubt that the Ewald test-meal, consisting as it does of a pint of weak tea and 2 oz. of toast, provides a useful medium for the analysis of the gastric contents, removed one hour after the meal has been consumed. The methods of analysis are capable of yielding accurate results, but it is obvious that our interpretation of such results is at fault. There are so many factors concerned in the secretion of gastric juice—viz., (*a*) nervous control; (*b*) blood-supply; (*c*) alteration in the secretory cells lining the stomach; (*d*) pyloric sphincter control over the emptying of the stomach—and these are not taken into consideration. This applies more especially to the Ewald test-meal, as we have a single analysis at the end of an hour's stay in the stomach on which to base our conclusions. Rehfuss[1] in 1914 devised a method of obtaining small quantities of the gastric contents at given intervals, thus enabling us to follow the whole course of digestion of a test-meal, and the variations met with both in health and disease. The method has received considerable attention in America, if one may judge from the numerous publications made by Rehfuss and his co-workers. Dr. C. M. Wilson alluded last week to the investigations at the Johns Hopkins gastro-intestinal clinic under Dr. T. R. Brown. The results of the application of this method of investigation of gastric function are far-reaching, and the method promises to become universal. It is simple to apply, and less unpleasant to the patient than the large stomach-tube and evacuator.

The use of the fractional test-meal has demonstrated very forcibly the fact that hyperchlorhydria is not such a definite pathological condition as we have been led to assume in the past. A large number of normal individuals show quite as definite a hyperchlorhydria as was previously considered to be pathological, and this gastric response applies to all varieties of foodstuffs. The discussions which followed papers read before the annual gathering of the American Therapeutic Society in May last fully emphasised this finding. It is quite clear from the observations made at this meeting that no one was able clearly to define hyperchlorhydria. Each individual varies in his gastric response to food, and the gastric mucosa may secrete an excessive amount of hydrochloric acid without any symptoms of hyperacidity. Dr. Julius Friedenwald, in discussing the treatment of hyperchlorhydria, considered that four ætiological factors were concerned in its production, and until the cause was discovered no proper

[1] Münchener medizinische Wochenschrift, Sept. 3rd, 1920.

[1] Rehfuss and Hawk: Jour. Amer. Med. Assn., 1914, lxiii., 11.

therapeutic measures could be instituted. The four ætiological factors were:—

1. Primary disturbance of the gastro-intestinal tract—e.g., ulcer, pyloric obstruction, acid gastritis, atony, and chronic constipation.
2. Constitutional and organic diseases—e.g., cholelithiasis, nephrolithiasis, chronic appendicitis, chlorosis, cerebro-spinal lesions, abdominal adhesions, and genito-urinary infections.
3. Nervous affections—e.g., mental strain, overwork, worry, neurasthenia, hysteria, and mental conditions.
4. Disturbances of the endocrine glands.

Dr. W. Wayne Babcock advocated the operation of cholecystogastrostomy to relieve cases of hyperchlorhydria, especially in those where the use of therapeutic measures have not given permanent relief. He considers that the pyloric area of the stomach suffers most from the irritation of the acid gastric juice and that the introduction of bile into this area relieves the irritation and prevents the formation of peptic ulcers. Dr. Rehfuss, in the discussion which followed, outlined his views, which were based on the results of his method of analysis of the gastric functions. The presence of hyperchlorhydria in people with no symptoms, and as high as that found in pathological cases, showed conclusively that it was not the quantity of acid which accounted for the symptomatology of this condition. On this account he could not conceive that direct communication between the gall-bladder and the stomach would benefit hyperchlorhydria. Reyfuss and Hawk[2] have recently summarised the results of their work on this subject. They have obtained a vast amount of experimental data, particularly as regards the normal gastric output both during gastric activity and rest. The variations met with in health must be clearly defined before any interpretation is placed upon the gastric analysis in disease. Besides the fact already noted that a number of normal individuals show a hypersecretory response to all classes of foodstuffs, they find that there are both fast and slow responses in the normal individual. The curve of gastric secretion is made up of psychic and chemical secretions, and by means of the new method these can be separately determined as well as the secretion in the fasting stomach, and also the amount of duodenal regurgitation. For an analysis of gastric function they use the Ewald test-meal, and divide the gastric responses met with in disease into four groups.

1. Clean digestion, showing simple secretory variations.
2. Secretory variations plus gastric mucus, indicating inflammation of the mucous membrane.
3. Secretory variations plus blood (intragastric) indicating ulceration of the mucous membrane.
4. Secretory variations plus blood, pus, mucus, and bacteria, indicating ulceration and infection of the mucous membrane.

They conclude that there is no specific curve in any gastric condition, and all that can be said is that disease may produce definite types of secretory and motor alterations.

Dr. J. A. Ryle's paper, published in THE LANCET of Sept. 4th on the investigation of gastric function, embodies a considerable amount of work on normal individuals, and represents a laudable attempt to analyse the factors concerned in gastric secretion. Hitherto this method of the fractional test-meal has not been taken up in this country, and we hope that Dr. Ryle's paper will receive the attention it deserves. He fully confirms the work of Rehfuss and others, and is able to give further information. The effect of different types of meal on the secretory curve is well shown in the curves, and demonstrates very clearly that in this method we have a ready means of studying the normal physiology of the stomach. A comparison of these curves with those found in pathological conditions is instructive, particularly the high acidity of the resting juice, the steep curve, and the continued secretion in the duodenal case (Chart 4). The method would appear to have almost unlimited applications, both in physiology and clinical medicine. Not only can we estimate the responses from the point of view of motility of the stomach, but the time relations of pain and other symptoms can be determined, also the local effects of drugs. The presence of pathological elements can be readily detected, and the presence of regurgitation of intestinal contents at the end of gastric digestion. The method, therefore, provides abundant data for the logical interpretation of gastric analysis. Further research is needed, especially upon the factors which produce alterations of function, as well as the appearance of certain pathological elements. The fact that carcinoma of the stomach in its early stages gives rise to very little disturbance of function emphasises the importance of such investigations.

[2] Reyfuss and Hawk: Jour. Amer. Med. Assn., 1920, lxxv., 449.

## NEUROBLASTOMA SYMPATHICUM.

Dr. P. C. Gunby,[1] of Rochester, Minnesota, records an example of this rare condition, the clinical diagnosis of which was confirmed by post-mortem examination. The patient was a boy, aged 13 years, who was brought to the Mayo Clinic for relief of failing vision, weakness, and small tumours of the scalp, which had first appeared six months previously. Examination showed a well-developed boy, moderately emaciated, whose skin was very pale with a slight greenish tint. The entire forehead and vertex were studded with nodules varying in diameter from 2 cm. to 6 cm. Moderate bilateral exophthalmos was present. A smooth mass was felt in the left hypochondrium. Ophthalmoscopy revealed bilateral choked disc, and a skiagram of the skull showed a diffuse porosity suggesting the osteoclastic type of bone malignancy. On the strength of these findings Dr. Gunby made a diagnosis of neuroblastoma sympathicum, probably primary in the left suprarenal. On the other hand, the possibility of hereditary syphilis was considered owing to the presence of papules and scarring about the body, a maternal history of miscarriages, scarring about the uvula and fauces, and slight roughening of the tibiæ. Anti-syphilitic treatment was instituted, but death took place about two months after admission to hospital without much change in the child's condition. The autopsy showed a large growth resembling malignant hypernephroma of the left adrenal, numerous metastases in the bones of the skull, sternum, vertebræ, ribs, and lateral lumbar and retro-aortic lymph nodes, very extensive tumour rarefaction and softening of the skull bones, hypostatic broncho-pneumonia, marked hyperæmia and hyperplasia of the spleen. There were no metastases in any of the parenchymatous organs. Microscopical examination of the adrenal tumour and of the metastatic nodules showed none of the characteristics of hypernephroma, but the tumour cells, tangled masses of fibrils, and rosette formation associated with neuroblastoma sympathicum were present.

[1] American Journal of Medical Sciences, August, 1920.

## STERILISATION OF PRIMARY SYPHILIS.

IN a recent issue of the *Bulletin de la Société Française de Dermatologie et de Syphilographie* an account is given by Dr. Jean Gouin and Dr. L. Leblanc of the serological reactions of cases of primary syphilis undergoing intensive treatment. The writers have found that in the great majority of cases of primary syphilis with a negative Wassermann reaction (W.R.) the blood becomes positive during the course of the initial intensive treatment. This phenomenon the authors term "activation sérologique," analogous to the "réactivation de Milian" or provocative W.R. of latent syphilis. Fifteen cases of primary sore were observed. Of these 12 gave a completely negative serum reaction and 3 a partially negative one. During the course of intensive treatment a positive W.R. was obtained in all of the 12 except one. When a weak reaction was obtainable at the beginning of the course a strong positive was subsequently observed. Treatment consisted of weekly injections of novarsenobenzol up to a total of 4 to 6 g. The W.R. was performed before every injection, and sometimes twice between injections. In some cases mercury was given in addition to

arsenobenzol. With regard to the period at which a positive Wassermann reaction was obtained the observations of these writers are in line with those of Levy-Bing and Gerbay. The serum reaction almost always became positive from 40 to 45 days after the infecting coitus. Too much stress is, as a rule, placed on the age of the chancre and too little account taken of the period of incubation. To obtain a truer valuation these two periods should be added together. Out of Dr. Gouin and Dr. Leblanc's observations several points of interest arise. If, in spite of the initiation of treatment at an early stage of syphilis, a positive reaction is nevertheless obtained during the course of treatment, is it legitimate to consider that we have sterilised that case? That being so, is it not desirable that repeated W.R.'s should be made during the course of treatment of every case of primary syphilis? If the serum reaction remains negative throughout, as it did in 1 out of the 15 cases mentioned, it is legitimate to regard such a case as sterilised. If, on the other hand, at any period after the starting of treatment the phenomenon of "activation sérologique" is observed the case must be regarded as one of secondary syphilis, regarded from the point of view of future treatment. The work of Dr. Gouin and Dr. Leblanc certainly suggests that fewer cases of primary syphilis are completely sterilised by early treatment than has been generally supposed.

## BENZYL BENZOATE IN WHOOPING-COUGH.

IN a number of important communications Dr. David I. Macht has reported the results of investigations made at the Pharmacological Laboratory of the Johns Hopkins University, which show an interesting relation between the chemical structure of the principal opium alkaloids and their action on smooth muscle. They can be divided sharply into two groups: the pyridin-phenanthrene, of which morphine is the principal member, and the benzyl-isoquinolin, of which papaverin is the principal. The morphine group is characterised by a stimulating action on smooth muscle, increasing its contractions and raising its tonus, while the papaverin has a sedative effect, inhibiting contractions and lowering tonus. Pharmacodynamic analysis of the papaverin effect points to the benzyl nucleus of the papaverin molecule as responsible for the sedation. Dr. Macht then searched for a simpler compound of the benzyl with the sedative effect of papaverin on smooth muscle and without its narcotic effect. He found that benzyl benzoate had all the effects of papaverin on smooth muscle and was much less toxic. The therapeutic applications naturally followed. The drug was tried in excessive intestinal peristalsis, pylorospasm, uterine spasm, spasm of the gall-bladder or urinary bladder, ureteral spasm, angiospasm, and other conditions, and found effective. In our issue of Sept. 4th (p. 512) we summarised another paper, by Dr. Macht, dealing with the effects of benzyl benzoate in hiccough. The drug was also found valuable in bronchial asthma. By a fallacious process of reasoning it was used in spasmodic conditions of the larynx, such as whooping-cough, in which the muscles involved are not smooth but striated. However, as according to some authorities whooping-cough is accompanied by more or less bronchial spasm, and Dr. Macht had noted some slight sedative effect in cough, he tried it. The results, which he reports in the Johns Hopkins Hospital Bulletin for July, were unexpectedly gratifying. All other medication was discontinued and a 20 per cent. alcoholic solution was given by mouth. The dose varied from 5 to 40 drops in water three or four times a day, according to age and severity of the disease. For young patients it was flavoured with a few drops of benzaldehyde and given in sugar, water, or milk. It was soon found that the addition of benzaldehyde, in amounts varying from 1 to 5 per cent., made the mixture more effective. About 90 per cent. of the patients showed more or less beneficial effects, and about 50 per cent. marked improvement. The effects were not curative but palliative—reduction in the violence or number of the paroxysms, or both, and elimination of such sequelæ of violent spasms as vomiting, subconjunctival hæmorrhages, lack of sleep, and emaciation. In many cases the relief was so marked that the parents came begging for more of the drug. Many of the patients who responded favourably to the drug had been treated unsuccessfully with bromides, antipyrin, quinine, belladonna, paregoric, and even heroin. In some cases, including three of Dr. Macht's own children, the benzyl was alternated with other treatment, none of which, excepting heroin in toxic doses, proved in the least effective. On the other hand, the benzyl benzoate with benzaldehyde gave remarkable relief both to violence and the number of the paroxysms. There was no evidence that the treatment influenced the duration of the disease. Dr. Macht then investigated the question, How does benzyl benzoate act in whooping-cough. In the first place, the anti-spasmodic effect on bronchial spasm probably plays some rôle. Secondly, he conducted experiments in regard to the action on striated muscle and found a sedative effect, but less than on smooth muscle. Thirdly—a fact of great importance—he observed a slight anæsthetic effect on the larynx. He also found that the anæsthetic action which he had shown to be marked for benzyl alcohol is exhibited in high degree by benzaldehyde, and to a lesser degree by benzyl benzoate, and that both the latter when taken by mouth are excreted in the saliva and bronchial excretions. They therefore probably diminish the sensitiveness of the irritable mucosa of the larynx, and so prevent the reflex which starts the spasms. Fourthly, he found that the benzyl esters are expectorants, and therefore probably help to liquefy the tenacious mucus which is found in the larynx in whooping-cough. Fifthly, he found that benzyl benzoate is sedative to the respiratory centre. Lastly, it was possible that the antiseptic properties of benzyl esters might play a rôle. The low toxicity of benzyl benzoate is important, and would allow administration in larger doses than those recommended.

## THE LIPOID GLAND.

IT has been recognised for some time that there are two varieties of adipose tissue: the familiar subcutaneous form, and another in which the fat occurs as small discrete droplets in cells grouped together in well-defined masses. Histogenetically these types of adipose tissue appear to be distinct, and observations on the hibernating glands of such animals as the hedgehog, and the interscapular glands in cretins, both consisting of this glandular fat, show that physiologically they are also different. In a valuable contribution to the current number of the *British Journal of Experimental Pathology* Dr. W. Cramer carries the matter a step further. He points out that in the embryos of all the mammalian species that have been studied a form of adipose tissue exists in which the cells, arranged in lobules, are rich in protoplasm and contain droplets of fat around a central nucleus. In most adult animals this tissue loses its distinctive appearance and is seldom recognisable macroscopically. In the rat and the mouse, however, the embryonic form persists throughout adult life, and can be distinguished very easily as sharply defined, reddish-brown masses. Typical glandular fat differs from ordinary adipose tissue in that its cells are rich in lipoids and contain a relatively large amount of protoplasm. But these differences are relative rather than specific, for the ordinary isotropic fat contains a varying proportion of anisotropic lipoids, while the glandular tissue may contain much true fat, with an apparent consequent loss of protoplasm. The essential difference, however, is brought out in fasting or overfed animals. When food is withheld from a rat or mouse the ordinary adipose tissue becomes greatly diminished in amount, but the glandular fat shows no obvious decrease. Conversely, in states of obesity the glandular fat shows hardly any increase. Still more striking are the results obtained by feeding animals on a diet free from all vitamines. In these circumstances the animals become extremely emaciated, and the glandular fat loses its lipoid contents. But it still remains as a tissue; its cells are large, rich in protoplasm and mitochondria, and are surrounded by capillary blood-vessels; it has, in fact, the characters

which one associates with an organ of internal secretion. Dr. Cramer brings forward a certain amount of evidence to show that glandular fat is functionally related to the thyroid and adrenal glands, and that it contains a reserve supply of a vitamine which can be drawn upon when this substance is absent from the diet. He suggests that this tissue should be known as the lipoid or cholesterin gland. The subject is obviously one of great interest, and offers a fruitful field for inquiry.

## AN ARTIFICE IN ABDOMINAL PALPATION.

PALPATION of the abdomen remains in many instances a crux for the present-day clinician. The numerous artifices suggested to render it more easy and overcome the contractions of the abdominal muscles and distension of the walls, besides trying our patience to the utmost, frequently fail us. But palpation is always the most valuable method of exploring the abdomen and the starting-point of all secondary and subsidiary investigations. Professor M. Ascoli,[1] of the University of Catania, has devised a simple method which he has found very helpful and which is, perhaps, not sufficiently well known. The manœuvre consists in this: to ask the patient, who is lying in a supine position with the head and shoulders slightly raised, to take hold of both ankles with his hands and forcibly drag them up, keeping the legs flexed on the thighs and the thighs wide apart and more or less completely flexed on the abdomen. By this means, owing to the discomfort of the patient's position, the consequent distraction of his attention and the force exercised by other groups of muscles, which can be increased by directing him to squeeze his heels, a complete relaxation of the abdominal musculature and flaccidity of the walls can be easily obtained. It must be understood that this artifice is neither universal nor infallible any more than any other, but it certainly deserves trial. In this position the examination is made by introducing one forearm between the patient's legs, while the other takes a lateral position, and when concentrating the palpation on any particular part the patient is asked to increase for a moment the flexion of the thighs. Nearly all methods of palpation can be applied in this position, including that of Hausmann. The method is simple and inoffensive to the patient when the pubic region is covered with a towel.

## THE AIR WE BREATHE.

THERE is a wealth of material in the second report just issued on "The Science of Ventilation and Open Air Treatment"[2] by the Medical Research Council from the pen of Leonard Hill, M.B., F.R.S., the director of the department of Applied Physiology to the Council. We dealt with Dr. Hill's first report in THE LANCET of Sept. 20th, 1919. A comprehensive and up-to-date treatment of the subject is again presented which will be read with profit by all those who have the question of healthy environment at heart. We begin to see from this report how antiquated were our ideas, amongst other things, of ventilation, artificial heating and lighting, and Dr. Hill's demonstration of the value of air in movement must bring conviction to the minds of sensible folk. The chemistry of the air is one thing, the physics of the air is another. Carbonic acid is a bogey, humidity and temperature are vital factors. The old rule laid down by Pettenkofer in 1860 and taught by sanitarians for 60 years, that the percentage of $CO_2$ is a rough indicator of the purity (or adaptability for respiratory purposes) of the atmosphere must go. Water (or humidity), with stagnation, is a greater poison than $CO_2$, simply by checking the function of that great organ, the skin. Apart from respiratory demands the environment should be such that the skin has freedom of action and a stimulus given to it by a constant flow of fresh air. This fact reminds us of the work of experimental diffusion in the physiological laboratory. As is well-known, the best and most complete results of carrying away the diffusible substance are obtained by keeping up a constant stream of water on the external side of the membrane. So with the respiratory and skin functions. Dr. Hill brings out these points vividly at the same time as he deals exhaustively with the subject in general. He commences with a dissertation on the phenomena of radiation, which is succeeded by a consideration of the penetration and action of light on living organisms. He next deals with the colour of the skin and racial adaptation to climate, passing on naturally to the emission, absorption, and reflection of light by white and black skin. Later he discusses in very interesting sections the influence of sunlight on the transpiration of wet black and white surfaces, with its practical bearing on the question of correct clothing. Heatstroke, food, and exercise conclude the first section. In Section II. we come to the chemical purity of the atmosphere in crowded confined places and in mines, the smoke nuisance, dust, heat stagnation and fitness, health and environment, the physics of clothing, fever, open-air treatment, and methods of ventilation and heating. The whole is a practical study of the common obstacles to the practice of health and the simple way out. It is scientific common sense all the way.

[1] La Riforma Medica, July 17th, 1920.

[2] The Science of Ventilation and Open-Air Treatment, Part II. Special Report Series, No. 52, published by His Majesty's Stationery Office.

## THE FIRST REPORT OF THE MINISTRY OF HEALTH.

THE Ministry of Health Act received Royal assent on June 3rd, 1919, its principal object being to concentrate the main health services of the country in a single department under a Minister of Health responsible to Parliament. Dr. Addison, the first Minister, has just issued the first instalment[1] of his first annual report, dealing in three sections with public health, local administration, and local taxation. The first year in such a reshuffling as was involved in the inauguration of a Health Ministry is naturally a period of reconstruction, for, in addition to its initial commitments, which were immense, the Ministry has during the year taken over from the Board of Education the medical inspection and treatment of school children, from the Home Office its powers under the Anatomy Acts, and other powers and duties in relation to lunacy and mental deficiency. Sanguine people may feel some disappointment that the promised outline of a comprehensive policy for the extension and development of health services has not yet been submitted to Parliament, and that the fate of the Poor-law still hangs in the balance. Dr. Addison explains in his prefatory note how the magnitude and complexity of the issues involved have combined with the heavy Parliamentary pressure in preventing the presentation of this policy as a whole. The broader work of the Ministry of Health still remains to be done. The present report is a chronicle of such developments and extensions of health work as could properly be set on foot without fresh legislation; important indeed, but of less burning interest than what is to come. The Minister of Health records his appreciation of the cordial coöperation in many spheres of action which he has received from authorities locally responsible throughout the country. It is on the continuance and further development of this coöperation that the success of the larger measures will chiefly depend. The coming year will doubtless be the arena of a bold attack on the larger issues. The annual report for 1919–1920 of the chief medical officer of the Ministry is announced to appear shortly in a separate volume.

THE Neurological Section of the Royal Society of Medicine has invited Dr. Henry Head, F.R.S., to deliver the Hughlings Jackson lecture, and it will be given at 1, Wimpole-street, London, W., on Oct. 7th, at 8.45 P.M. The subject of the lecture will be "A New Conception of Aphasia."

[1] Cmd. 923, H.M. Stat. Office. Price 1s. 6d.

# PUBLIC HEALTH IN SOVIET RUSSIA.

BY L. HADEN GUEST, *M.C.*, M.R.C.S. ENG., L.C.C.
SECRETARY AND PHYSICIAN TO THE BRITISH LABOUR DELEGATION.

## III.—ASTRAKHAN AS A CENTRE OF INFECTION.

THE unfortunate illness of a member of the delegation made it necessary for him to remain on board the s.s. *Bielinski* when we arrived at Saratoff, and as I could not leave him my journey on the Volga was extended right down to Astrakhan. Two other members of the party—Mrs. Snowden, a member of the delegation, and Mr. Bertrand Russell, who came with us—remained on the steamer with me to nurse the patient. During this voyage we lived with Mr. B. M. Sverdlov and his staff, and without the official receptions, speeches, and parades which had been our lot up to that time.

### *Lack of Antimalarial Measures.*

On approaching Astrakhan I was struck by the complete absence of all measures to prevent malarial infection. The fact that I insisted on fitting up the invalid's cabin windows with mosquito muslin was evidently a revolutionary proposal—copied, by the way, by all the staff who could obtain the very scarce material. Conversation on this subject led Mr. Sverdlov to ask me to undertake an inspection of Astrakhan and report to him on the hygienic measures necessary to prevent malaria and improve health conditions generally. I accepted this suggestion after some demur (on the ground of poaching on the Russian doctors' preserves) for two reasons: (1) the wish to assist in any way I could with suggestions for improving the demonstrably lamentable conditions, and (2) the desire to see for myself the actual conditions from the medical inspector's rather than the medical tourist's point of view. On arriving at Astrakhan I had a conference with the chief medical officer of the town, Dr. Mishkin, and his assistants, Drs. Sandler and Saccal, and got from them a great deal of general and also of precise information in answer to a questionnaire which I had previously drawn up. On June 6th I made an inspection of the town in general, including the surroundings, the two large rubbish deposit areas, and the hospitals. On June 7th I inspected the waterworks and some other parts of the town. I was informed that Astrakhan had only recently come under civilian control, having been up to about three weeks previously in the hands of the Red Navy, who, I was told, had done pretty well what they thought fit.

### *General Sanitary Condition of the Town.*

The town contains about 200,000 inhabitants, and is built on the delta of the Volga on marshes, and surrounded by marshes. Ferry steamers—which were busy and crowded—are necessary to connect parts of the town which are separated by arms of the river. At the time of our visit the temperature was over 120° Fahrenheit in the shade, and the place extremely oppressive. The streets themselves are very dirty. No water carriage system for sewage exists, and the sanitary service of refuse-collecting carts for the conveyance of rubbish and fæces to the dumping grounds outside the town has been suspended for over a year. In many streets there were long continuous heaps of refuse and fæces, about 2 ft. high, dried into a compact mass all the way down the middle of the roadway. Very many houses had been partly destroyed by severe aeroplane bombing, and in one street practically every house was gutted, the outer walls alone standing. The dump-grounds for refuse had been untouched for about a year and were deserts of drifting dust. The waterworks was in such a state of disrepair that the pumping-engines spouted water from the joints of the machinery at each stroke, and the large iron store-tanks had to be plugged with match-like bits of wood wherever the water pressure broke through their thin crust, and the sand filter was simply not working. The sand filter also leaked into the road—a very broad although squalid avenue—in front of the works, and formed a little lake about an acre in extent. Nevertheless, the water-supply to the town is still maintained, and the engineer in charge (a man with the typical appearance of chronic malaria) was of opinion that the water in the pipes was purer than that in the Volga. It was less discoloured, but the filter was quite useless against bacteria. Another defect of the waterworks is that its intake was in the region of the Astrakhan docks in the Volga, about 50 yards from the bank, and, on the day of my visit, immediately behind the stern of a steamer apparently engaged in trade with Baku in the Caspian.

### *Mosquito-breeding Grounds.*

Not only are the streets dirty, but pools of water are common everywhere—at the roadside, in the gutters, on bits of waste land where holes have been excavated, in the middle of the road, and, in fact, everywhere where a depression in the ground exists. One of the first things to attract my attention on leaving the boat and walking out of the dock gates was a little stagnantly moving gutter stream covered with a green water weed into which a large bright-eyed frog plopped on my approach. This little gutter stream meandered out from under a wooden paling higher up the road and no doubt went on to the Volga. In many of the near by streets there were large pools in the road. The basements of the gutted houses previously referred to were flooded with water. Round the town are wide expanses of shallow water covered with picturesque whispering reeds—6 to 10 feet high—with little creeks creeping up to the house walls and winding into the town itself. On going into the matter in detail with Dr. Mishkin and his assistants I found that seven-tenths of the area of the town is water surface. When I asked what was being done about the flooded basements, the pools in the streets, the gutters, and the accumulation of water on waste land in the town, I was told that it would dry up later on in the year. Meanwhile nothing was done. When I inquired what was being done about the picturesque lagoons of reed-shaded waters creeping right up to the town I was told they were too extensive to tackle. It was a case of "Nitchevo" (Never mind)—a universally employed Russian expression embodying the spirit of that passive non-resistant acceptance of adverse conditions of hardship and evil which is characteristic of Russian people.

### *Universality of Malaria.*

Under these conditions I was not surprised to learn that malaria is universal and distributed over all sections of the population. Fishermen, who live in extremely picturesque wooden shanties on the edge of the river or on islands only an inch or two raised above its surface, suffer most. The population on a little hill—or rather mound—in the centre of the town on which the local fortress (Kremlin) is built suffer least. The outskirts of the town are more affected than the centre. When I pressed the importance of these facts and asked why at least drainage of pools and stagnant water in the town itself was not carried out, I was told that it had been discussed, but that there was a lack of labour and materials. Both of these statements were true in general, but nevertheless it was possible to get labourers from Persia for the docks (Mr. Sverdlov arranged this while we were in Astrakhan), and a good deal might have been done with no more implements than a few shovels and picks.

When I suggested that there was an unlimited supply of oil available at Baku (connected by railway and steamer lines) for spreading over pools, I was told that this was not done for fear of killing breeding fish and injuring the fish industry and caviare industry of Astrakhan. But however valid this reason might have been for certain water areas, it did not apply to the mosquito-breeding grounds immediately round and in the town, which were mere stagnant pools or waste expanses of water. The treatment of malaria in Astrakhan was no more satisfactory than the prevention. There was no attempt at the isolation of cases, no material for isolation, and a practically complete absence of quinine. I did not have time to examine individual cases at Astrakhan, but I did so at Saratoff, where I saw two malaria cases untreated with quinine

with spleens extending to below the umbilicus, a condition I was assured was common. Most of the cases of malaria in Astrakhan are said to be benign, but there had been ten malignant cases lately with sudden coma as first sign of illness. The mortality from malaria was stated to be about 20 per cent., "probably more." Eight-tenths of all cases of illness in the town were malaria. The last year for which statistics are available is 1914, when 16,180 cases of malaria were registered out of a population of 140,800. The largest monthly number of cases were registered in August and December. Men were most affected between 20 and 40, women between 15 and 30.

*Suggested Measures for Sanitary Organisation.*

The public health organisation for dealing with these conditions was not adequate. The town was divided into six districts, and for each of these areas a sanitary medical officer was appointed. But each "sanitary medical officer" held three, four, or more other appointments of a clinical kind and had, in consequence, very little time to devote to his duties. Also, each sanitary officer had only two men to assist him in each district, who were paid and rationed on a low scale, and no transport of any kind.

As I was asked for suggestions I made those obvious ones connected with drainage, treatment by oil and removal of rubbish, familiar to all with any experience of antimalarial work, and, in addition, suggested that the "sanitary medical officers" should be relieved of all

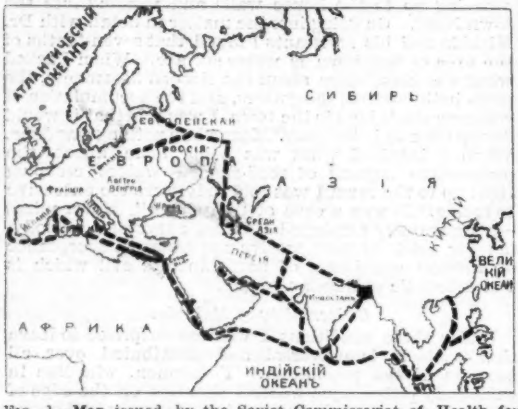


FIG. 1.—Map issued by the Soviet Commissariat of Health for educational purposes to show the principal routes of the spread of cholera from India.

other work but paid the salary for all appointments relinquished; and, further, that the sanitary personnel should be largely increased (to 24 for each district), supplied with transport, and paid and rationed on the Red Army scale, and selected from those having knowledge of sanitary matters, or, failing these, from people of education who would appreciate the importance of sanitary work. I also suggested that a small fee should be paid for notification of infectious disease by doctors, sanitary service men, or representatives of the trade-unions. Other detailed suggestions were made regarding general cleanliness and for dealing with and preventing cholera and plague. Mr. Sverdlov travels with an advisory medical officer on his staff of experts, and this officer (a woman, Dr. Dmitrieff) entirely concurred in my suggestions.

*The Town as a Danger Centre.*

The existence of Astrakhan as a centre of malarial infection is serious enough (I was glad to get all my own party away without any of them falling ill), but when it is realised that it is one of the chief places from which cholera and plague spread it is difficult to exaggerate its importance. Last year there were 600 cases of cholera in Astrakhan and a very limited traffic on the Caspian Sea and on the Volga. This year a great many cases are expected, and there is much traffic on the Caspian Sea and the Volga, while the condition of the waterworks can only be described as admirably arranged to spread an epidemic. From Astrakhan the cholera will spread up the Volga and through Russia. The map (Fig. 1), issued by the Commissariat of Health for educational purposes, shows the probable routes of infection. How near it will come to Western Europe remains to be seen. I was told that cholera comes to Astrakhan from up the Volga, that it increases in virulence in Astrakhan, and then spreads up the river again. The kind of poster propaganda undertaken by the Russian Government is shown in the illustration (Fig. 2), but is reinforced in the original by a picture below the one reproduced showing a cholera patient receiving intravenous injections in hospital. There was no plague in Astrakhan or on the Steppe to the East at the time of my visit, but

DESCRIPTION OF PROPAGANDA POSTER.

The illustration given on the opposite page is part of a Soviet propaganda poster showing the path of infection in cholera by means of water and flies. In the original poster a panel below portrayed a cholera patient in extremis being treated by saline injection. A microscope and a microscopic field of cholera germs were also pictured. The Russian text printed on the poster is as follows:—

PROLETARIAT OF ALL COUNTRIES, UNITE!

Cholera is a contagious disease, attacking principally those who live in dirty, poor, and overcrowded districts.

The great scientist, Robert Koch, discovered that cholera is caused by certain microbes.

These microbes are the smallest living atoms, which can be seen only by the help of a microscope, and are called cholera germs.

The symptoms of a light attack of cholera are diarrhœa, and sometimes sickness.

The symptoms of a severe attack are diarrhœa, sickness, great loss of flesh, coldness and blueness of the whole body, stopping of the urine, and cramp.

On the second or third day, and sometimes in a few hours, it can end in death.

Those who recover carry the germs for some time and may infect others.

Flies often carry the germs of cholera from the motions of the sick to food and objects of domestic use.

Especially dangerous is the infection by cholera germs of the water-supply, causing widespread epidemics among the population using the springs.

The cholera germs cause infection only when the microbe enters the intestines either by way of the mouth in food or drink, or by dirty hands. Milk, vegetables, fruit and other products bought at the markets or from hawkers may be infected by cholera.

Together with the motions containing the cholera germs, the contagion infects the soil, clothes, domestic utensils, food and drinking water and through them is carried to other people.

Uncovered water-supplies cannot be effectively protected from dirt, consequently this water can be used only after having been filtered or boiled.

In cases of cholera infection, hurry at once to the hospital, only there can you receive the necessary help. The placing of the sick in hospital removes the danger of spreading the disease among relatives and neighbours.

if it comes there is nothing to prevent its spread. Amœbic dysentery is also very serious in the town and neighbourhood, and there had been 100 cases of operation for hepatic abscess during the last 12 months.

Typhus and relapsing fever had devastated Astrakhan last winter as every other place in Russia, and I was told a story of the marching out of a Cossack army toward the Caucasus and the finding of some thousands of unburied bodies on the ground a day or two's march from the town, where an epidemic had stricken the army down. No really reliable statistics over a long period were available since 1914, but I give here the number of cases of actual illness of certain kinds on June 7th as stated to me by the chief medical officer, and which do not include malaria or dysentery.

*Cases of Infectious and other Serious Illness at Astrakhan in Hospital on June 7th, 1920.*

| | | | |
|---|---|---|---|
| Scurvy ... ... ... | 642 cases. | Typhoid fever ... | 14 cases. |
| Relapsing fever ... | 306 ,, | Small-pox ... ... | 6 ,, |
| Typhus fever ... | 196 ,, | Indefinite fevers ... | 29 ,, |

There were stated to be "casual cases" of diphtheria and "quite a number of deaths" from measles. Vaccination (in contradiction to what I was told at the

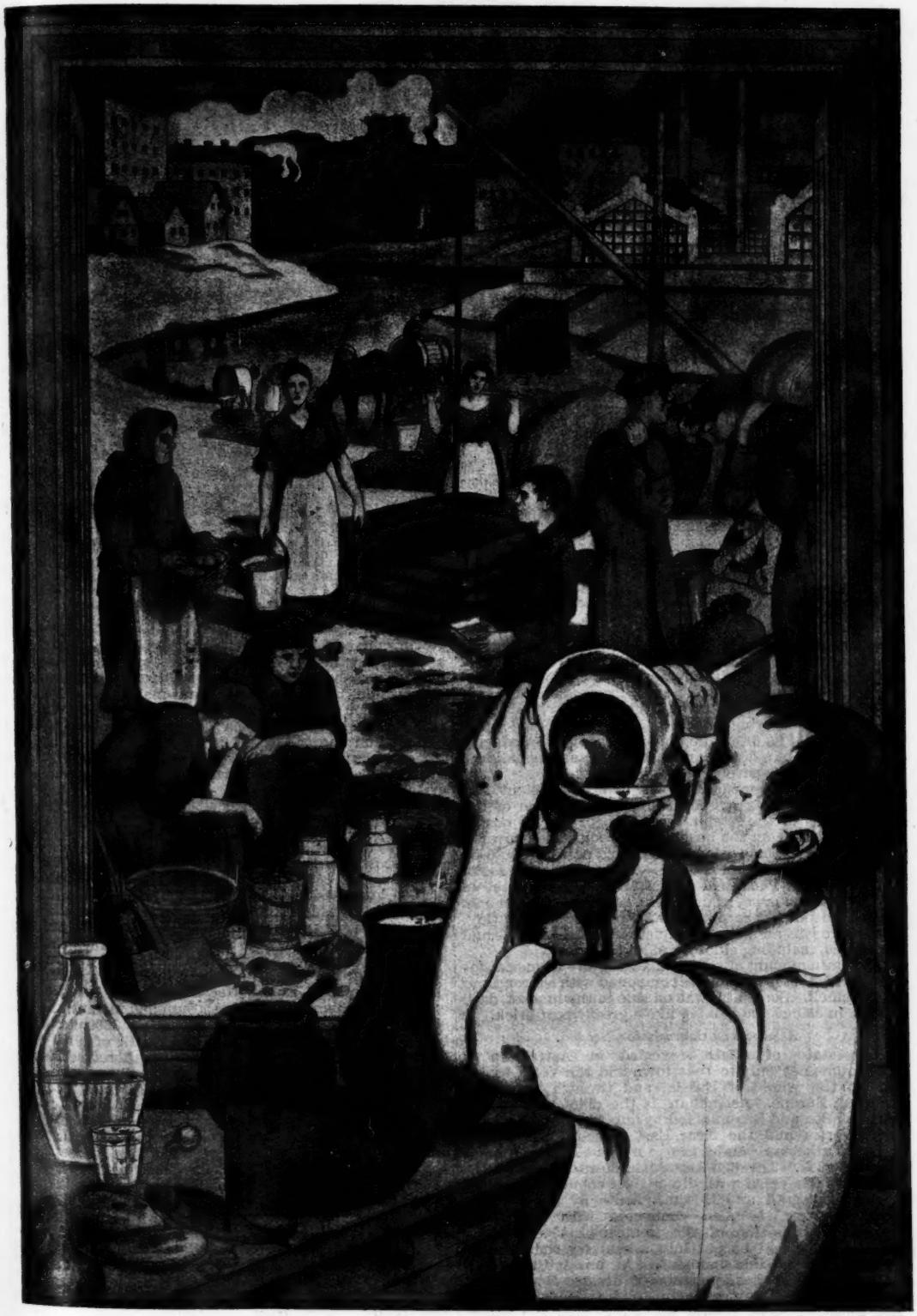

FIG. 2.—A SOVIET PROPAGANDA POSTER. *(Description on opposite page.)*

FIG 3.—Part of a Soviet propaganda poster showing effects of small-pox with recommendation to seek vaccination. On the original poster is a group of children and adults being vaccinated. The Russian text runs substantially thus: "Many die from small-pox, many become blind, and those who recover remain pock-marked. To protect yourselves from small-pox is easy; you must be vaccinated several times during your life. The fulfilment of the law of vaccination is the duty of every citizen of the Republic. Vaccinate yourselves against small-pox, and repeat the vaccination not less than every five years."

Commissariat of Health in Moscow) was said not to be compulsory; it was also said that there was a lack of vaccine and that the practice of vaccination had slackened during the revolution. Propaganda in favour of vaccination is also being done by poster, the upper part of one, showing effects of small-pox, being reproduced here (Fig. 3), while underneath (not reproduced) is a picture of a doctor and nurse vaccinating children brought by their parents.

Hospital accommodation was both insufficient and bad. Immediately outside the window of one of the main wards of the hospital was the edge of an oozing mud of fæces from the hospital cesspool, which covered a large area of the garden. I was told nothing could be done for the familiar reasons. It was another case of "Nitchevo." The ward was full of flies, which, of course, swarm everywhere. The general arrangements of the hospital were not good, it was dirty and untidy, and there was an almost complete absence of drugs and dressings, including chloroform and ether.

A certain amount of soap is made locally from seal-fat and fish-fat. It is a repulsive compound with a strong and nasty smell. Some of it was on sale in the market, dark brown in colour and looking like a greasy half-brick.

*A Sanitary Commission Needed.*

The state of affairs revealed in Astrakhan is dangerous, not only to that town and the Volga basin, but to the whole of Russia, and through Russia to Western Europe. Astrakhan is the chief port of the Caspian Sea and is connected by important trade routes with Persia and the Near East through Enzeli and with Turkestan and the further East through Krasnovodsk. Through Astrakhan flows the great river traffic up the Volga with direct river connexions reaching to Petrograd and Moscow. Both by railway and sea Astrakhan is also connected with Baku and Petrovsk. It is thus of the greatest importance that Astrakhan should be put into a sanitary condition at the earliest possible moment. At present the town is a fortress or headquarters of disease from which it may sally at any moment to invade the rest of the world. I have reason to believe that the Soviet Government would consider the question of receiving a foreign sanitary commission to put matters into good order, and among the first tasks of such a commission would be: (1) extensive anti-malarial measures; (2) provision of special hospital accommodation for malaria and other infections; (3) general de-lousing and disinfection campaign; (4) repair and improvement of waterworks; (5) general cleanliness campaign; (6) provision of system of medical inspection of steamers arriving and departing and of travellers arriving by boat, by train, or otherwise.

*Similar Conditions Rule Elsewhere.*

I have dealt with Astrakhan in some detail because it is the town I have most detailed information about in Russia and because of its own individual importance, also because I believe it to be typical of the conditions now existing in many provincial towns in Russia. Streets are very commonly extremely dirty—the streets of Samara were as dirty as those of Astrakhan, although those of Saratoff were much cleaner; general housing conditions in the villages are described as very bad by the Commissar of Public Health. Vermin infection is excessively common. Statistics supplied me at Saratoff show that parasitic infections increased by 1500 per cent. between the middle of 1918 and the middle of 1919. The morale of the medical personnel has suffered seriously in the long war and revolution, and some have given up hope of change for the better. Also nearly all doctors are overworked. In many places there are no doctors at all. In the whole Astrakhan province outside the town I was told that there was only one doctor. And there is an almost complete lack of medicines, dressings, disinfectants, and soap. Despite the great and heroic efforts of the Commissariat of Health the organisation of civilisation is literally, as at Astrakhan, crumbling to pieces. It seems to me a condition in which the medical profession of this country might well offer the services of a non-political mission of help and health to our Russian colleagues, who are tried so much beyond their strength. The financial and political arrangements could perhaps be made directly by the Governments concerned.

*(To be concluded.)*

# CLINICAL TEACHING AT LONDON SCHOOLS OF MEDICINE:

## THE PROFESSORIAL UNITS.

As stated in the leading article of our Students' Guide, published on August 28th, a representative of THE LANCET recently visited the five medical schools which have adopted the clinical unit system to ascertain the structure and proposed functions of the professorial units. In all cases the innovation is so recent that the arrangements are to be regarded as tentative and experimental. Nevertheless, it is clear that there are distinct divergencies of practice which are of importance only in so far as they depend on differences of principle and not on local conditions. It will be instructive to watch the future development of the clinical units in the five schools, as it is impossible to determine at present whether the differences are fundamental and likely to increase or whether they will tend to disappear. We have not attempted to indicate the arrangements for research, which are in most cases still incomplete, but it may be reiterated that the whole conception of the unit system depends on the choice of a clinical teacher from among those who are actively engaged in medical investigation and research.

### *St. Bartholomew's Hospital Medical School.*

The unit staff of St. Bartholomew's Hospital Medical School is as follows:—

*Medical.*—Director; Vacant (full time). Assistant Director: Dr. F. R. Fraser (half time). Assistants: (1) Dr. A. E. Gow; (2) Dr. G. Graham (three-quarter time). Resident House Physician.

*Surgical.*—Director: Mr. G. E. Gask (full time). Assistant Director: Mr. T. P. Dunhill (half time). Assistants: (1) Mr. R. Ogier Ward; (2) Mr. G. L. Keynes (three-quarter time). Resident House Surgeon.

The professorial clinical unit, as it is called at St. Bartholomew's Hospital, consists of surgical and medical firms, differing from the non-professorial firms mainly as follows:—

1. Since the directors are continuously in hospital the routine superintendence of patients is done in the mornings or at any odd times, so that the official "round" can be devoted to the demonstration of cases interesting to the students.

2. The units have their own laboratories, all on the same floor, where full pathological investigations, including morbid histology, Wassermann and Widal tests, chemical pathology and bacteriology are performed by the unit staff, who also do their own post mortems. In cases of difficulty reference can be made to the appropriate department of the pathological institute.

*Clinical work.*—As to the order in which clinical appointments are held, great latitude is allowed to students at St. Bart.'s. A typical student, after passing intermediate, does six months' consecutive in-patient dressing. He may dress for any one of five surgical firms, of which the unit forms one, and this post includes dressing in casualty, though not in the out-patient department. At St. Bart's the casualty department is under the supervision of members of the honorary staff, and deals with a large number of cases which in many other hospitals would be treated as surgical out-patients. Certain cases, perhaps six or eight, of special interest for teaching purposes are selected and these only are referred to the out-patient department, where old in-patients, followed up on a card index system, are also seen. The director and assistant director each spend one morning in casualty and teaching in the out-patient department. There they are attended by senior out-patient dressers and not by the dressers to the unit firm. The beds allocated to the unit are shared by the directors. This arrangement is peculiar to the professorial unit since the members of the senior staff at St. Bart.'s do not see out-patients. In order to ensure a complete investigation and discussion on all cases the bacteriologist to the hospital accompanies the director on his rounds from time to time, while the lecturer on morbid histology pays regular visits to the unit laboratories and demonstrates on the microscopical sections of the cases. After six months in the surgical wards a student acts as clerk to the in-patients to a medical firm other than the professorial unit for three months, and then proceeds to the out-patient departments, to courses on fevers, pathology, and so forth. He then returns to the wards for a second three months' clerking, and it is these senior students who, as far as vacancies allow, become clerks to the medical unit. The medical clerk attends out- as well as in-patients with the unit staff. Private rounds are done in the morning while the student works up his cases; the afternoons are spent in formal teaching in the wards. In the past session Sir Archibald Garrod, the late director, devoted one afternoon to post-graduate teaching, from which the undergraduates were, however, not excluded.

*Pathology.*—Though, as has been emphasised, the unit undertakes its own pathology, the dressers and clerks are not expected to perform the actual investigations except the minor ones. The senior students learn post-mortem and other pathological technique in the pathological institute when attached as pathological clerks to members of the visiting staff.

*Remarks.*—In the future it is hoped that the unit, besides working as a firm, will organise combined demonstrations in medicine, surgery, and pathology on individual cases, to be attended by all students during their first period of clinical work. Detailed technique, such as splint application or the use of instruments of diagnosis, will probably not be taught in these demonstrations, where an attempt will be made to focus the attention of the student on the fundamental unity of all processes of disease, and on the close connexion between medicine, surgery, and pathology.

### *London Hospital Medical School.*

The unit staff of London Hospital Medical School is as follows:—

*Medical.*—Director: Dr. C. H. Miller. Assistant Director: Dr. A. W. M. Ellis. Assistants: (1) Dr. G. Riddock; (2) Dr. Maitland-Jones. Resident House Physician. Assistant House Physician.

*Surgical.*—Director: Mr. H. S. Souttar. Assistant Director: Mr. E. C. Lindsay. Assistants: (1) Mr. W. S. Perrin; (2) Mr. G. E. Neligan. Resident House Surgeon.

The teaching activities of the London Hospital clinical units are centred in:—

1. A concentrated course of clinical medicine and surgery, one month each, through which every junior student must pass.

2. The organisation of special series of lectures, open to senior students and post-graduates, by experts, not necessarily members of the units, on their special subjects.

*Clinical work.*—The London Hospital student, having passed intermediate, spends the next three months as a pathological clerk, learning practical morbid anatomy and clinical pathology before entering the wards. Then the units take him over. He does a concentrated course of one month with each unit, comprising, on the surgical side, the elements of case-taking and of theatre work and dressing. He learns the technique of clinical examination; demonstrations of typical cases in the wards are given, also demonstrations in splint application and plaster work, and the students attend at operations. During this month the student has no duties outside those of the unit, and his time is fully occupied in getting a sound foundation before entering the wards as a dresser. On the medical side a month is taken up with learning the elementary principles of physiology as applied to medicine and the methods of clinical examination and of treatment. Demonstrations are held in the wards, out-patient departments, and children's departments. Besides these courses, which are taken by all students, a certain number—as many as possible of those who apply—do three months' dressing and clerking with the unit as a firm. This appointment differs from an ordinary post as clerk or dresser only in so far as the chief is on the spot all day to supervise, direct, and encourage the student. When possible the student does the second of his two three-months' post in the unit firm in medicine and in surgery. The units undertake neither systematic lectures nor revision courses at present. The former are given by the lecturers in medicine and surgery, and the tutorial classes by the appropriate tutor. The units at present confine themselves to the teaching of junior students, to organising series of special advertised lectures held for fourth and fifth year students and open to post-graduates, and to clinical teaching in the wards and out-patient department.

*Pathology.*—The students on the unit firm perform blood counts and investigations of sputums, urines, and so forth, but for their own edification only; all investigations are done also in the pathological department of the hospital. Ward laboratories are to be built in the future, where students may be required to do more work under supervision.

*Remarks.*—The system of note-taking in triplicate devised by Mr. A. J. Walton has been adopted by the units. The notes of the director and his assistant are kept separately, and belong to the unit. The notes of the house physician are filed with the hospital records, while the students' corrected notes alone are on the bed boards. These may be removed and kept by the student for future references.

*St. Mary's Hospital Medical School.*

The unit staff of St. Mary's Hospital Medical School is as follows:—

*Medical.*—Director: Dr. Wilfred Harris (half time at present). Assistant Director: Dr. C. M. Wilson (10–4, five days a week). Resident House Physician.

*Surgical.*—Director: Mr. W. H. Clayton-Greene (half time at present). Assistant Director: Mr. C. A. Pannett (10–4, five days a week). Resident House Surgeon.

At this school the chief changes coincident with the establishment of the clinical units are:—

1. The rearrangement of the time-table in order to leave free the hour 12–1 for all hospital students to attend demonstrations given on alternate days by the medical and surgical units. Cases are allocated to senior students, who are encouraged to consult the literature and to demonstrate and discuss not only the individual case but the ætiology and the pathology of the disease.

2. In order to ensure to students a thorough experience in diseases of children and in chronic cases arrangements have been made for amalgamation for teaching purposes with the Paddington Green Children's Hospital, the Maida Vale Hospital for Nervous Diseases, and the Paddington Infirmary. The teaching at the children's hospital is to come into operation next session; last session demonstrations were given from time to time at Maida Vale, and one afternoon in each week was allocated by each unit to a round at the infirmary with senior students. On one afternoon round, at which a representative of THE LANCET happened to be present, the cases demonstrated included senile gangrene of the toes, Pott's disease with spastic paraplegia, cellulitis following varicose ulcer, and advanced inoperable carcinoma of the intestine—none of these being cases ordinarily met with by students.

*Clinical work.*—The student at St. Mary's passes from his intermediate studies to the casualty department for two months, during which time he also passes through courses of elementary surgery and medicine and elementary clinical pathology. He then does three months' surgical in-patient dressing, followed by three months' in-patient medical clerking, in each case with the unit or one of the two other firms. After three months in the out-patient department he returns to the wards. The second three months in-patient clerking and dressing are usually done in the second hospital year.

At St. Mary's no definite courses of lectures are arranged by the unit, and neither the systematic lectures nor the junior clinical courses and demonstrations are given under its auspices. The units attempt to use the enormous quantity of material at the disposal of the teaching staff since the amalgamations and to train all the students to extract the utmost scientific information from their clinical work. The daily demonstrations are attended by all the students, and the ward and theatre demonstrations by the students on the post and by senior students. A feature of the ward teaching is the limitation of the numbers attending demonstrations, which entails their frequent repetition.

*Pathology.*—The pathology of the unit is done in the appropriate departments of the pathological institute, where senior students work under the supervision of the staff of the departments, who are responsible for its accuracy. On one afternoon in every week naked-eye specimens and microscopic sections are sent to the unit laboratory, where they are demonstrated by the surgical director with the clinical notes. The pathological technique is learnt by the student in due course when he does his pathological clerkship, and it is considered that no advantage would be gained by the medical clerk and surgical dresser if he were expected to do more than routine pathological investigations as well as his other duties.

*St. Thomas's Hospital Medical School.*

The unit staff of St. Thomas's Hospital Medical School is as follows:—

*Medical.*—Not yet formed.

*Surgical.*—Director: Sir Cuthbert Wallace (part time). Deputy Director: Mr. B. C. Maybury (part time). First Assistant: Mr. W. W. Wagstaffe (whole time). Pathological Assistant: Dr. S. C. Dyke (whole time). Resident House Surgeon.

The work of teaching is divided between the surgical staff and that of the unit; there has been no attempt on the part of the unit to take over or direct all the teaching. Owing to the composite nature of the student's education and the growth of special departments it is considered that the correlation of teaching must be the function of the dean and the body that governs the school and not of the unit.

The lectures that are now given in the medical school are modelled on the system which was instituted just before the end of the war. Instead of having lectures on medical medicine and surgery, a subject is taken and lectures on it are given by the members of the staff and of the unit who are best acquainted with the subject, and by the other departments, such as those of anatomy, physiology, radiology, &c., when these can help.

It is felt at St. Thomas's that it is especially necessary to avoid the unit's becoming an isolated realm within the school.

*Clinical work.*—The student at St. Thomas's after he has passed intermediate, and before he takes up his work in the hospital proper, passes through a course in elementary medicine, surgery, clinical pathology, bacteriology, and pharmacology which is intended to fit the student to benefit by the teaching in the wards. The teaching is shared by the departments concerned and the unit. It is an open point whether all or only a certain number should work under the unit as a firm. At present it is felt that a short period in the unit is of little use, and dressers are taken on for six months.

The actual teaching undertaken by the unit at present is as follows: (1) A teaching round for senior students. (2) Two rounds for junior students, one of which takes the form, frequently, of a clinical lecture demonstration. (3) An out-patient afternoon, in which out-patients and old ward-cases are seen. (4) The deputy director and the first assistant take one morning each in the sorting-room, where senior students are admitted to watch the practice of the hospital. (5) The deputy director takes a class once a week in surgical anatomy. In this class the dissected specimen and the live model are used side by side. This class keeps the unit in touch with the anatomical department. (6) The pathological assistant gives classes in physiology and pathology, and it is hoped that he may also be a link between the unit and the physiological department.

*Pathology.*—The pathological investigations which are required for each case the student conducts himself under the direction of the pathological assistant. The latter will have the benefit of the advice of the professor of pathology, thereby forming a link between the unit and the pathological department proper.

The unit laboratory accommodation is spacious, and consists of (1) a small laboratory for the pathological assistant; (2) a large laboratory where each student will have his own place; (3) a small departmental library or meeting-room; (4) an office.

*University College Hospital Medical School.*

The unit staff of University College Hospital Medical School is composed entirely of full-time officers as follows:—

*Medical.*—Director: Dr. T. R. Elliott. Deputy Director: Dr. J. W. McNee. Assistant in Neurology: Dr. F. M. R. Walshe. Resident House Physician.

*Surgical.*—Director: Mr. C. C. Choyce. Assistants: (1) Mr. E. K. Martin; (2) Mr. F. J. F. Barrington; (3) Pathologico-surgical Registrar, not yet appointed.

The important alterations which accompanied the establishment of clinical units at University College Hospital are as follows:—

1. The units assume entire responsibility for the whole of the systematic teaching, respectively, in medicine and surgery. This does not imply that the teaching is now confined to the personnel of the units, but that they have undertaken to organise it, and the lectures given by other members of the staff on subjects in which they are specially eminent or interested are given by invitation of the directors of the unit concerned. The tutorial and revision classes are held by members of the unit; no attempt is made to give revision classes for post-graduates.

2. All physicians and surgeons on the honorary staff now have an equal number of beds and all take out-patients. This arrangement is said to have the treble advantage that the senior and most experienced physicians and surgeons teach in out-patients' department, that students in any firm are enabled to watch a given case from the day of its appearance in the hospital until its discharge from the wards and after, and that the younger members of the staff are not hampered for many years by lack of beds.

3. The gift of £800,000 made this year to the medical school by the Rockefeller Board will enable a Unit in Obstetrics and Gynæcology to be established, also on a full-time basis, as soon as the necessary new buildings are completed. The school will then be equipped with three complete units.

*Clinical work.*—After passing his intermediate the typical student at the University College Hospital proceeds directly to the wards, where he spends six months as clinical clerk or dresser, four of which are on another firm and two on the unit firm, and six months as surgical

dresser, two of which are similarly on the unit firm. It is fortuitous whether students do medicine or surgery first, but in the opinion of the directors it is more advantageous to do medicine first and also to be attached to the unit firm for the last two months in either subject. In the future it is hoped by the directors that two months' work as clerk or dresser will be postponed to the second clinical year, so that the practical study of general medicine and surgery will be continued up to the end of the student's hospital career.

All students spend two months attached to each unit firm. On the medical side the unit clerks take cases among the tubercle patients under Dr. S. J. Martin, Dr. H. Batty Shaw, and Dr. F. J. Poynton; children and infants under Dr. McNee; heart cases under Dr. T. Lewis, and nerve cases under Dr. Walshe; and their time-table is arranged to include rounds with these members of the staff.

*Pathology.*—The pathology of the cases under the care of units is at present done in the pathological department, where the senior students hold clerkships and learn technique. The surgical unit proposes shortly to add to its staff a pathologico-surgical registrar, who will work in laboratories to be erected near the wards and will be responsible for the pathology. The sections will be cut and stained by students on the unit firm under his supervision; the pathological department of the hospital will thus not receive the pathological material from the unit firm as a routine, but will act as consultants when required.

On the medical side the unit clerks at present do the sputum and urines, but when laboratories are developed in direct connexion with the wards more pathological work will be done by the clerks and medical staff of the unit. It is considered that the students doing the clinical work must collect more of the pathological evidence themselves in order that they may learn to appreciate its value in diagnosis.

## TUBERCULOSIS IN WALES:

### THE WORK OF THE WELSH NATIONAL MEMORIAL.

TEN years ago this month the King Edward VII. Welsh National Memorial (Tuberculosis) Association was inaugurated. When the tuberculosis provisions of the National Health Insurance Act, 1911, came into force this Memorial Association, a voluntary institution owing its existence largely to the financial generosity of its president, Major David Davies, received support from various Welsh health authorities, who delegated to it their responsibilities with respect to the treatment of tuberculosis. Steadily through the last decade the Association has been consolidating its position, skilfully guided through some local opposition and many pitfalls by its general director, Mr. D. W. Evans.

The past 12 months has been especially momentous in its history. In the first place its position as a Welsh national institution was fully recognised when their Majesties, accompanied by Princess Mary, opened the North Wales Sanatorium for women and children at Llangwyfan, overlooking the far-famed Vale of Clwyd, and the South Wales Sanatorium for men and boys, placed in scarcely less beautiful surroundings at Talgarth; then it is able to record that the last outstanding health authority in the Principality, Pembrokeshire, has thrown in its lot with the Association, moved thereto by discovering that the expenses involved in a separate tuberculosis scheme would mean a 5*d.* rate as contrasted with the 1*d.* rate asked by the Association; next it can point out that a stern financial battle with the Treasury authorities to obtain full recognition has resulted in its favour; and, finally, it is enabled, owing to private generosity, to announce the foundation of a chair of tuberculosis in the Welsh National School of Medicine, the occupant of which is to be principal medical officer of the Association, so holding a unique position. These four facts are no mean achievements to record as the result of post-war activities.

The work of the Association is carried on by pooling the resources of the Principality; this enables the most up-to-date treatment to be established in economic units, surgical cases being drafted to specialised hospitals, medical cases to others, and sanatorium cases to yet other specialised institutions. Every advantage to the patients and to economic management is in this way obtained. The Association has at its disposal, distributed over some 14 institutions, between 1100 and 1200 beds, a total which is being steadily increased. The medical staff numbers over 20 and is also being rapidly increased. These increases are needed to cope with the flow of work, as may be seen from perusal of the annual report for the year ending March 31st, 1920, which has just been issued with commendable promptitude.[1] The following summary table is of interest in this connexion:—

| Patients. | 1913–14 | 1914–15 | 1915–16 | 1916–17 | 1917–18 | 1918–19 |
|---|---|---|---|---|---|---|
| Examined ... ... ... | 8,763 | 8,868 | 9,155 | 10,739 | 11,780 | 12,260 |
| Received sanatorium treatment ... ... ... | 888 | 1,214 | 1,290 | 1,360 | 1,258 | 1,251 |
| Received hospital treatment ... ... ... | 1,185 | 1,789 | 2,178 | 2,504 | 2,551 | 2,380 |
| Received institute treatment ... ... ... | 3,722 | 5,203 | 4,720 | 4,690 | 5,143 | 4,867 |
| Recommended for domiciliary treatment | 1,200 | 1,634 | 1,944 | 2,924 | 3,317 | 3,548 |

The result of sanatorium treatment is summarised in the next table, which wisely is not brought forward further than 1918, since more recent figures in Columns 4, 5, and 6 would obviously be fallacious for comparison with previous years. Indeed, in relation to this table we should like to be informed when the figures for previous years cease to be revised. Some period, say five years, should be fixed, since, for instance, everyone included in Column 2 must with effluxion of time finally appear in Column 6.

*Return of Patients who were Discharged from Sanatoriums from the Year 1912 to 1918.*

| Year. | Number discharged. | Well and at work March 31st, 1920. | Not well. | Left the district and cannot be traced. | Dead. |
|---|---|---|---|---|---|
| 1912 | 42 | 13 (30·95%) | 2 (4·77%) | 9 (21·42%) | 18 (42·86%) |
| 1913 | 515 | 210 (40·79%) | 35 (6·79%) | 78 (15·14%) | 192 (37·28%) |
| 1914 | 790 | 341 (43·16%) | 64 (8·10%) | 104 (13·17%) | 281 (35·57%) |
| 1915 | 877 | 388 (44·24%) | 77 (8·78%) | 138 (15·73%) | 274 (31·25%) |
| 1916 | 894 | 440 (49·22%) | 74 (8·27%) | 115 (12·87%) | 265 (29·64%) |
| 1917 | 862 | 478 (55·44%) | 93 (10·79%) | 91 (10·56%) | 200 (23·21%) |
| 1918 | 879 | 505 (57·45%) | 123 (14·0%) | 79 (9·0%) | 172 (19·55%) |

One activity calls for special reference. The renewal of the education campaign under the direction of Dr. R. Owen Morris, which was developing on excellent lines when interfered with by the war. This campaign is built on the sound foundation that treatment will never eradicate tuberculosis, but that "the community must learn the principles and practice of hygienic living and the methods of prevention." This campaign should be more widely extended; 357 lectures in schools and 23 public lectures are insufficient for the Principality.

We note that a colony for training discharged Service men suffering from tuberculosis is being embarked upon in connexion with the Talgarth Sanatorium. Valuable information as to the efficacy of after-care through this form of industrial convalescence should in this way be obtained, which may be expected to result in the Association extending it from ex-Service men to civilians, victims of peace-time conditions. We feel some confidence that ere long no sanatorium will be considered complete without special workshops suited to the special needs of those local industries from which the patients are drawn.

The report further contains the welcome information that a scheme of research work only awaits the appointment of the principal medical officer to be undertaken. We have long felt the coping-stone the Association needed to its structure was closer coördination of medical work directed more particularly towards research, for which the facilities at the disposal of the Association are admirably suited. We look forward to information in the next annual report stating that action has commenced on these lines. From such action valuable results must ensue.

[1] Annual Report for the Year Ending March 31st, 1920, of the King Edward VII. Welsh National Memorial Association. W. Whittington Neath.

## MEDICINE AND THE LAW

*The Patient's Consent to Operation.*

AT a recent inquest at Liverpool upon the body of a woman who had died in the infirmary after an anæsthetic had been administered for the purpose of an operation, relatives of the deceased complained to the coroner that they had not been informed that an operation was to take place, and that the patient had not consented to undergo it. Evidence was, however, given that the patient had been informed that an operation was necessary, and that she had raised no objection. The coroner's comment was to the effect that the written consent of the patient should be obtained if possible. Certainly the most desirable course, but one which it is not always possible to follow, is to obtain the signature of the patient to a written consent, or the patient's verbal consent in the presence of a witness or witnesses. Further, the reasons for the operation and its possible consequences should be explained to the patient, and any consent in writing should acknowledge that this has been done. In the case of children the consent should be that of a parent or guardian. The above, no doubt, is the ideal course, but in hospitals there must necessarily be occasions when an operation presents the only possible, albeit uncertain, means of saving life, and when the patient is not in a condition to give or to refuse consent. Also, when this occurs there may be no relative present, and it may not be possible to communicate with any relative without such delay as would endanger the patient's life. In such circumstances as these it is clearly the surgeon's duty to do his best in the patient's interest, and it may be pointed out that the presence of the latter in the hospital, if voluntary, is in the nature of a submission to the treatment to be decided upon by its staff. In the case of a man who is brought into a hospital as the result of an accident, and operated upon at once as the only possible means of saving his life, although his consent could not be obtained, it is hardly conceivable that relatives would complain or that a coroner or jury would listen to them if they did. The case of Beatty *v.* Cullingworth, in which a female patient sought for damages from a surgeon on the ground that, having obtained her consent to the removal of one of her ovaries, he eventually removed both, will be remembered. It points to the desirability of any authorisation of an operation being in general terms, so that the surgeon may be free to act as conditions may dictate.

*The Conduct of Maternity Homes.*

The keeper of a maternity home at Lewisham, the registration of which had been cancelled by the London County Council, appealed to the magistrate sitting at Bow-street. Mr. Graham Campbell, having reserved his decision for consideration, dismissed the appeal. The registration had been cancelled on account of the evidence as to the conduct and character of the appellant and as to the unsuitability of the premises and their equipment for their purpose. The magistrate upheld the decision of the Council on both points, and made an order that the appellant should contribute £50 towards the cost of the appeal. No one who has read the evidence as reported can doubt the correctness of this decision on the facts deposed to by the witnesses. With regard to the question of the appellant's moral character, it is, of course, desirable for all keepers of nursing homes to be persons of good character. In the case of establishments maintained for profit in order that women may be delivered of children in them, it is absolutely essential if the evil results connected with the traffic in "unwanted" babies are to be controlled.

*The Duty of Anyone Finding a Dead Body.*

In the case of the death of a girl named Irene Munro, apparently murdered near Eastbourne on the night of August 19th, comment upon any matters connected with the alleged crime would now be out of place. It is, however, permissible to deplore the delay which apparently intervened between the finding of the dead body by a child accompanied by his mother and the informing of the police. Not only did this postpone investigation generally and quite unnecessarily, but it had as its result that the first medical examination of the corpse on the spot where it was found was made several hours later than it need have been, and at night instead of by daylight. To leave a dead body undisturbed is clearly right, in view of a possible crime, but to communicate the fact of its discovery immediately to the authorities is the simple duty of any citizen, and withal an act of common-sense.

## IRELAND.

(FROM OUR OWN CORRESPONDENTS.)

*Dangerous Economies of the Dublin Corporation.*

THE economies resulting from the deadlock between the Dublin Corporation and the Government concerning the payment of Government grants towards local services are extending even further than was outlined in this column a week ago. Not only is the entire service as regards tuberculosis to cease, unless—an unlikely event—it can be carried on by public subscription, but the housing, the public health service, the provision of school meals for children, and other activities directly concerning the health of the people are all being seriously interfered with. Contributions to the Dublin Union and to the Richmond Asylum are to be decreased, so that these two necessary institutions will also suffer. Moreover, all employees of the corporation, of every rank, are to have 25 per cent. of their salaries or wages held back for nine months from Oct. 1st. It is likely that other public bodies will decide to exercise similar crippling economies, and the health of the country is bound to suffer.

*The late Mr. Robert Campbell.*

The Belfast Medical School and the whole profession in the North of Ireland have sustained a great loss by the death, on Sept. 6th, of Mr. Robert Campbell. Mr. Campbell had been for years one of the most sought-after consulting and operating surgeons in Ulster. In March of this year he had a cerebral hæmorrhage, from which he recovered sufficiently to resume practice, but three weeks ago an acute attack of Bright's disease, the chronic nephritis from which he had suffered since his boyhood, became acute and he died from uræmia in his fifty-fifth year. The son of a clergyman, Mr. Campbell was born at Templepatrick, County Antrim, and was educated at the Royal Academical Institution and later at Queen's College, Belfast. He obtained the Coulter exhibition (for clinical excellence) at the Royal Victoria Hospital in 1891, and graduated M.B. R.U.I. in 1892, and became F.R.C.S. Eng. in 1896, when he started practice in Belfast. In 1898 he was appointed surgeon to the Belfast Hospital for Sick Children, and in 1900 he became assistant surgeon to the Royal Victoria Hospital, Belfast. With these two institutions he remained connected until his death. During the war he was surgeon to the Ulster Volunteer Force Hospital. Mr. Campbell was a member of that body of able professional men in Belfast who owed much of their subsequent success to the thorough training in anatomy they received from one of the most inspiring teachers of his time—the late Dr. Redfern, professor of anatomy at Queen's College, Belfast; and they revolutionised surgery in the North of Ireland. His publications include "The Operative Treatment of Hernia in Infants and Young Children, Illustrated by 114 Consecutive Cases," published in THE LANCET of Jan. 9th, 1904, and articles on the operative treatment of perforated typhoid ulcer, thyroidectomy for exophthalmic goitre, and acute appendicitis, in the Transactions of the Ulster Medical Society, of which he was at one time President. Mr. Campbell had the complete confidence of those of his professional brethren who were best able to judge of his skill, while the public at large were impressed with what to them is, after all, the real test, the success of his operative work. Mr. Campbell was a strong personality, dogged, persevering, and

determined (despite his own ever-present ailment) to do the very best for his patients in any emergency. He possessed the rare power attributed to the Greeks of thinking before he acted and of acting too. With a rather reserved and silent manner, he was full of the keenest humour. His strenuous life, his splendid work, and his upright conduct will long be an example to be followed in the Belfast Medical School.

*Officialdom and War Pensions.*

The proposal made at the last meeting of the Tyrone War Pensions Committee to appoint two whole-time sub-secretaries for the different sub-committees met with much criticism. Dr. E. C. Thompson said new officials were unnecessary, and would only add to the already intolerable burdens of the county. If the Pensions Ministry would only diminish and revise their regulations, there would be little difficulty in carrying on all the work necessary for wounded soldiers. The general feeling was that the interests of the wounded men were being submerged in officialdom, and that the men wanted their pensions arranged at once and to be released from hospital. A resolution embodying these views having been proposed, it was seconded by Dr. Thompson, passed unanimously, and sent to the Ministry of Pensions.

Sept. 14th.

# Public Health.

## REPORTS OF SCHOOL MEDICAL OFFICERS.

### CARLISLE.

Of the 7100 children in average attendance at the schools in Carlisle during 1919 more than half (3630) were medically inspected at the routine examinations, or as special cases, or at visits of reinspection during the year. Of the first-named group, numbering 2814, 35 per cent. were found to be suffering from some defect requiring immediate attention, and a further 28 per cent. were directed to be kept under observation.

Nutrition was considered defective in 9·23 per cent., but only in three children was any actual treatment required. Cleanliness on the whole is improving, as shown by a table of the conditions found during the last ten years; but at two surprise visits vermin were found in the heads of girls in 9·3 and 5·9 per cent. respectively, and nits in 26 and 27·9 per cent. of the 3000 odd children examined. This shows that a great deal has still to be done in the way of education of the parents as to their duties. No arrangements are made by the education committee for the cleansing of verminous children, and Mr. Joseph Beard, who presents this report as medical officer of health and school medical officer, doubts if much benefit would result therefrom. There were only 33 cases of scabies found at the routine examinations, the total number found being 146, a considerable improvement over the two years preceding. There were only 11 cases of ringworm among the code group children, but the total number of cases was 115, and 13,289 "school days" were lost (averaging 116 per child). X ray apparatus has been installed and no doubt there will be a considerable saving of school time during the present year. Thirty-one children were found to be suffering from organic heart disease, but in only 2 cases was treatment considered necessary; the remaining 29 children, together with 37 cases of functional heart disease, are noted as to be kept under observation. It may be permissible to doubt whether *any* child with definite organic disease of the heart can be properly considered *not* to require treatment—that is, not only careful management and supervision with regard to diet, exercise, and instruction, at home, in the school-room, and the playground, but also medical examination at frequent intervals to determine the cardiac condition. If merely recommended "to be kept under observation" such cases are apt to be overlooked. Sudden death from morbus cordis in school or in the playground is a catastrophe to be guarded against in every possible way.

With regard to visual defects, it is stated that 583 children were referred for examination by the oculist; out of 186 cases of refractive error, hypermetropia and hypermetropic astigmatism accounted for 138, while of myopia and myopic astigmatism there were only 32 cases. Except for measles (670 cases), which was prevalent from September to December, there was no epidemic outbreak of importance.

A very interesting account is given of the results of tuberculosis treatment during recent years in Carlisle. The disease became notifiable in 1911; since then 732 children under 14 have been notified, of whom 362 were males and 370 females; 530 suffered from pulmonary tuberculosis, and of these cases the disease has been arrested in 63 per cent., while in 10 per cent. it is still active; among the remainder 52 are known to have died, 3 have been killed on active service, and 72 cannot be traced. Of 113 children who received sanatorium treatment for the lung affection the disease has been arrested, or is quiescent, in 76; in 26 the disease has not been arrested, 7 have died, and 4 cannot be traced. Among 50 cases of glandular tuberculosis the disease has been arrested in 42. Of 732 children notified as suffering from all forms of tuberculosis in the period 1911–1918, in 60·8 per cent. the disease has been arrested, in 9·6 per cent. it is still active, 16·9 per cent. have died; the remainder (12·7 per cent.) cannot be traced. "The high percentage of cases arrested or cured is extremely gratifying, and is a distinct encouragement to take all steps possible to search out tuberculosis in its early stages and apply prompt treatment."

### CARDIGANSHIRE.

In Cardiganshire previous to 1919 there had been no medical inspection of school children for more than two years. During 1919 it was resumed and 3006 children were systematically examined, besides 187 special cases. In only 653 cases were the parents present.

Not more than 29 children (of whom 27 were boys, according to the table on p. 12 of the report) were returned as "ill-nourished," but Dr. L. Meredith Davies, the school medical officer, states that "the general physique of the majority of the children is very poor." The two statements are difficult to reconcile. A child may be below normal as regards physical development and yet be in good health; but if the general physique is considered to be "very poor" it seems inconsistent to return "malnutrition" in only 29 cases out of 3000 children. In regard to provision of a mid-day meal there are difficulties. No doubt many of the children come some considerable distance to school. It appears that in eight schools some provision is made, but 78 schools "either do nothing or provide hot water or tea or cocoa." The condition of the schools as regards sanitary matters appears to be in many instances unsatisfactory; insufficient water-supply and washing arrangements, the continued existence of middens and privies, and inadequate methods of sewage disposal are mentioned. Dry cleaning and dusting of the school-rooms is still the common practice. As Dr. Davies says, "it is mostly by means of education that one can hope to improve the deplorable condition which exists." Some useful suggestions are made, which, it is to be hoped, may speedily be carried out; these include provision for drying children's clothes, as many of them "have several miles to walk in the morning before reaching school," and arrangements for children coming from a distance, by which "the meals should be served in an orderly fashion, with tablecloth and proper cutlery on the table. Teachers and monitors should be appointed to superintend the meals." (The educational value of such a meal might be considerable.) The provision of dual desks, and the importance of the proper direction and regulation of window lighting are also very rightly insisted on. Many other matters of educational and sanitary importance are dealt with in this interesting report, which, unfortunately, has many typographical errors; these, however, as well as many of the conditions calling for improvement in the schools referred to, may perhaps be attributed to difficulties of communication. The "sweet shire of Cardigan" yields to none in the Principality for historical interest and beauty of scenery, but its railways are few and roads none of the best. Improvement will come in time.

### CHESTERFIELD.

At Chesterfield 1726 children were systematically examined in the code groups during 1919, as well as 316 special cases.

The nutrition was on the whole satisfactory, only 12 among these 1726 children being considered to be badly nourished. (Table, p. 9. In table on p. 14, referring to nutrition, and also apparently applying to the same groups of children, 25 are stated to be badly nourished). The most numerous defects found were those of the teeth (7·65 per cent.), throat (4·86), and vision (4·40). Only 4 cases of pulmonary tuberculosis were definitely diagnosed (0·23 per cent.), but the disease was suspected in 22 other children (1·27 per cent.). No provision for open-air classes has yet been made in Chesterfield. Dr. R. Fraser urges the importance of this matter, and points out that it would be quite easy to arrange for classes to be held in the playgrounds, suggesting also that open-air instruction might be carried out in the parks of the town, as has been done at Nottingham. Free dinners were provided from November to February for 241 school children, 78·8 per cent. of these being the children of strikers. The cost of

the meals (meat and vegetable stew, followed by a milk pudding) averaged 5*d*. per child, and the results were evidently satisfactory. There was no infectious disease of importance in any school necessitating closure except a few cases (3) of scarlet fever at Hasland C.E. school, but measles (127 cases) and influenza (155) were somewhat prevalent.

## URBAN VITAL STATISTICS.

(Week ended Sept. 11th, 1920.)

*English and Welsh Towns.*—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18 million persons, the annual rate of mortality, which had been 9·9, 9·9, and 10·0 in the three preceding weeks, rose to 10·3 per 1000. In London, with a population of nearly 4½ million persons, the annual death-rate was 10·0, or 0·3 per 1000 above that recorded in the previous week, while among the remaining towns the rates ranged from 4·4 in Merthyr Tydfil, 5·1 in Reading, and 5·6 in Southend-on-Sea, to 18·3 in West Hartlepool, 18·7 in Dewsbury, and 18·8 in Warrington. The principal epidemic diseases caused 259 deaths, which corresponded to an annual rate of 0·8 per 1000, and comprised 171 from infantile diarrhœa, 38 from diphtheria, 20 from whooping-cough, 14 from measles, 12 from scarlet fever, and 4 from enteric fever. The deaths from infantile diarrhœa, which had increased from 87 to 171 in the five preceding weeks, were again 171, and included 43 in London, 10 in Liverpool, and 9 each in Birmingham and Hull. The mortality from the remaining diseases showed no marked excess in any of the large towns. There were 2633 cases of scarlet fever and 1484 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, against 2402 and 1404 respectively at the end of the previous week. The causes of 19 of the 3506 deaths in the 96 towns were uncertified, and included 2 each in Birmingham, Warrington, Manchester, Rotherham, and West Hartlepool.

*Scotch Towns.*—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2½ million persons, the annual rate of mortality, which had been 10·8, 11·1, and 9·8 in the three preceding weeks, rose to 11·2 per 1000. The 239 deaths in Glasgow corresponded to an annual rate of 11·2 per 1000, and included 11 from infantile diarrhœa, 3 each from whooping-cough and diphtheria, and 2 from small-pox. The 69 deaths in Edinburgh were equal to a rate of 10·5 per 1000, and included a fatal case each of infantile diarrhœa and diphtheria.

*Irish Towns.*—The 112 deaths in Dublin corresponded to an annual rate of 14·1, or 0·4 per 1000 above that recorded in the previous week, and included 17 from infantile diarrhœa. The 132 deaths in Belfast were equal to a rate of 16·7 per 1000, and included 7 from infantile diarrhœa and 2 from scarlet fever.

## BOOKS, ETC., RECEIVED.

BAILLIÈRE, J. B., ET FILS, Paris.
La Cure de Diurèse. By Dr. C. Ricard-Pomaréde. Pp. 80. Fr. 3.

BAILLIÈRE, TINDALL, AND COX, London.
Clinical Lectures on Enlargement of the Prostate. With a Description of the Author's Operation of Total Enucleation of the Organ. By Sir Peter J. Freyer, K.C.B., M.D. 5th ed. Pp. viii. + 174. 10*s*. 6*d*.

BENNO RONEGEN VERLAG, Leipzig.
Die Natur und Kultur des Pockenerregers und das Wesen der Pockenimpfung. Eine patho- und nosogenetische Studie zur Sozialhygiene. Von Dr. von Nieken. Pp. 66.

CASSELL AND CO., London.
Clinical Methods. By R. Hutchison, M.D., and H. Rainy, M.D. 7th ed. Pp. 685. 12*s*. 6*d*.

CHURCHILL, J. & A., London.
Massage: Its Principles and Practice. By J. B. Mennell, M.D., with an Introduction by Sir R. Jones, K.B.E., Major-General, A.M.S. 2nd ed. Pp. 536. 21*s*.
A Handbook of Physics and Chemistry. Adapted to the Requirements of the First Examination of the Conjoint Examining Board of the Royal Colleges of Physicians and Surgeons, and also for general use. By H. E. Corbin, B.Sc. Lond., and A. M. Stewart, B.Sc. Lond. 5th ed. Pp. 496. 15*s*.

ENGELMANN, W., Leipzig.
Das Menschliche Gehirn. Auflage III. Von Dr. R. A. Pfeifer. Pp. 124.

UNIVERSITY PRESS, Cambridge.
Fall of the Birth-rate. By G. Udny Yule, M.A. Pp. 44. 4*s*.
Industrial Colonies and Village Settlements for the Consumptive. By Sir German Woodhead, K.B.E., M.D.; and P. C. Varrier-Jones, M.R.C.S., L.R.C.P. Lond. With Preface by Sir Clifford Allbutt, K.C.B., M.A., M.D., F.R.S. Pp. xii. + 152. 10*s*. 6*d*. net.

**MANCHESTER FRENCH HOSPITAL.—A course of five** post-graduate lectures is being held on Thursdays, in September, at 4.15 P.M. The two lectures still to be given are by Dr. A. G. Magian, on Tubal Abortion (Sept. 23rd) and Ovarian Pregnancy (Sept. 30th). Medical men will be cordially welcomed.

# The Services.

## THE RANK OF NAVAL MEDICAL OFFICERS.

IT has been decided by the Admiralty that medical officers who entered the Service on or after August 4th, 1914, will not have to pass a qualifying examination for the rank of surgeon lieutenant-commander. These officers, however, when they have obtained between two and six years' seniority in that rank, and after a preliminary course of study, will have to qualify by examination for promotion to a higher grade. Surgeon lieutenant-commanders will be eligible for accelerated promotion according to the class of certificate obtained in the qualifying examination after having been recommended for advancement. Surgeon lieutenant-commanders who fail to pass at a second trial will be compulsorily retired with a gratuity which shall not exceed £100 for each complete year's full-pay service, nor be above a maximum of £1000. Officers who entered the Service before August 4th, 1914, may voluntarily take the course and sit for the examination.

Payment of provision allowance instead of hospital allowance will be made to all medical officers serving in naval hospitals and other establishments at home, with retrospective effect to July 1st, 1919, where the officers victual themselves, and no advantage is obtained from the purchase of provisions at Government rates. In the case of medical officers serving in naval hospitals and establishments abroad the provision allowance should be substituted for the hospital allowance, subject to the conditions stated.

## THE COLONIAL MEDICAL SERVICE.

The conditions under which medical men may join the various colonial medical services were set out in the columns of our Students' Number on August 28th, and as we then indicated alterations tending towards improvement in the working of the services were to be expected in the near future.

The Committee appointed in November, 1919, to inquire into the Colonial Medical Services, which included the names of Sir William Leishman, Sir James K. Fowler, and Sir Humphry Rolleston, has now presented a report, the main recommendations of which are as follow: (1) A unified service. Hitherto a candidate has applied for appointment in a special colony; the Committee recommends that in future admission should be to "The Colonial Medical Service." (2) The appointment of a director-general, to advise on all matters relating to the personnel of the Service. (3) That candidates should be recently qualified medical men who have held some resident hospital appointment. (4) The selection of candidates by competitive examination, which might be general for all the public services. Candidates to be interviewed and approved before being examined. The examination would serve, in the Committee's opinion, to bring the existence of the Service before the bulk of the medical profession, to whom it is at present almost unknown.

The report deals with pay—a minimum of £600 per annum is recommended—pensions, leave, and promotion. The hope is expressed that the adoption of the measures suggested may remove the present causes of discontent and raise the Colonial Medical Service to a high place amongst the public medical services of the Empire.

In a letter addressed to the chairman of the Committee and printed as an apppendix to the report, assurance is given of Lord Milner's interest in the recommendations, some of which have already been carried out in particular colonies.

## DEATH OF SIR WILLIAM BABTIE, V.C.

Lieut.-Gen. Sir William Babtie died on Sept. 11th in Belgium, where he was spending a holiday. He was born on May 7th, 1859, the eldest son of John Babtie, J.P., of Dumbarton. Educated at Glasgow University, he became M.B. Glasg. and L.R.C.P., L.R.C.S. Edin. in 1880, entering the Army Medical Service in the following year, and reaching the rank of Major in 1893. During the international occupation of Crete in 1897–98 he served as senior medical officer, receiving for his services the C.M.G. Throughout the South African War he was on the staff of the Natal Army, being present at all the actions for the relief of Ladysmith and at the subsequent operations in Natal and Eastern Transvaal. It was at Colenso that he won the Victoria Cross for his courage in attending the wounded under fire and in attempting to save Lord Roberts's son. At this time he was promoted Lieutenant-Colonel and received the medal with five clasps. Along with initiative and great personal courage Babtie's abilities as organiser and administrator had already shown themselves, and after serving from 1901–06 as assistant and from 1907–10 as Deputy Director-General he became in 1914 Director of Medical Services in India, and later filled the same office in the Mediterranean.

Nominally responsible in part for the medical defects in the expedition to Mesopotamia, his work came under the survey of the Commission of Inquiry, which, however, made it clear that his tenure of a responsible post when war broke out had been very brief, while the atmosphere in which he worked was unfavourable to reform. The Army Council therefore justly decided to retain General Babtie's services as Director of Medical Services to the War Office, and in 1916 he was appointed K.C.M.G., being promoted K.C.B. in 1919. Since 1914 he had been honorary surgeon to the King.

## AWARD OF THE VICTORIA CROSS.

The King has approved the award of the Victoria Cross to the late Temp. Capt. Henry John Andrews, M.B.E., of the Indian Medical Service—

"For most conspicuous bravery and devotion to duty on Oct. 22nd, 1919, when as senior medical officer in charge of Khajuri Post (Waziristan) he heard that a convoy had been attacked in the vicinity of the post and that men had been wounded. He at once took out an aid-post to the scene of action and, approaching under heavy fire, established an aid-post under conditions which afforded some protection to the wounded but not to himself.

"Subsequently he was compelled to move his aid-post to another position, and continued most devotedly to attend to the wounded.

"Finally, when a Ford van was available to remove the wounded, he showed the utmost disregard of danger in collecting the wounded under fire and in placing them in the van, and was eventually killed whilst himself stepping into the van on the completion of his task."

## ROYAL NAVAL MEDICAL SERVICE.

Surg.-Lieut. (Dental) F. W. Paul to be Surgeon Lieutenant-Commander (Dental).

## ROYAL ARMY MEDICAL CORPS.

Lieut.-Colonel R. J. W. Mawhinny relinquishes the temporary rank of Colonel.

Lieut.-Col. H. S. Roch relinquishes the acting rank of Colonel.

Major T. T. H. Robinson relinquishes the acting rank of Lieutenant-Colonel.

Capt. and Bt. Major M. J. Williamson to be acting Lieutenant-Colonel.

Capt. F. C. Tibbs and Temp. Capts. D. Miller and W. B. Swete-Evans relinquish the acting rank of Major.

Capt. J. C. Preston, from Spec. Res., to be Captain.

Major W. Bruce, from N.Z. Med. Corps, to be Captain.

Capt. N. Cantlie is seconded for service with the Egyptian Army.

The undermentioned Captains are restored to the establishment: W. C. Hartgill, C. D. M. Buckley, T. J. L. Thompson.

Capt. H. L. C. Noel resigns his commission.

Temporary Captains relinquishing their commissions and retaining the rank of Captain: F. C. Plummer and C. G. Burton.

### SPECIAL RESERVE OF OFFICERS.

Capt. W. W. Shorten relinquishes the acting rank of Major.

Officers relinquishing their commissions:—Capt. K. D. Murchison (granted the rank of Lieutenant-Colonel). Captains retaining rank of Captain: M. C. Cooper, T. H. Rhys, T. O'Mahoney, H. J. Blampied, S. H. de G. Pritchard, C. A. W. Ramsay, C. Tighe, G. F. Hurst, J. A. Panton, J. W. W. Baillie, M. O. Simpson, R. S. Corbett, F. J. Charlton, E. O. Goldsmith, E. R. Batho, P. S. G. Cameron, D. C. Beaumont, H. G. V. Mence, D. V. Murphy, J. S. B. Forbes, J. McKay, R. S. Aspinall, C. Shearer, J. S. Graig, G. M. S. Smith, R. P. Smith, A. Piney, J. W. W. Newsome, D. J. MacKinnon, J. C. Pyper, C. L. Somerville, J. B. S. Lewis, J. McI. H. Smellie, J. S. Bow, J. Ashforth, L. C. Moore, J. A. Ross, M. J. Cahalane, C. Wood, J. J. Conybeare, W. M. L. Gabriel, W. V. Robinson, R. A. Olphert, A. D. Fraser.

### TERRITORIAL FORCE.

Capt. O. Teichman to be Deputy Assistant Director of Medical Services, 2nd London Division.

Major A. C. Oldham and Capt. B. M. Footner are seconded under para. 112, T.F. Regulations.

Capt. E. Alderson to be Major.

Capts. A. M. Davie and A. M. Mackay resign their commissions and are granted the rank of Major.

Captains resigning their commission and retaining the rank of Captain: D. M. Johnston, C. W. Greene, F. C. Pridham, G. C. Soutter.

Supernumerary for service with the Officers Training Corps, Belfast University Medical Unit Contingent, Sen. Div.: Capt. G. G. Lyttle relinquishes his commission.

## ROYAL AIR FORCE.

Capt. (acting Lieut.-Col.) J. J. C. Hamilton is transferred to the unemployed list.

## INDIAN MEDICAL SERVICE.

Major M. Ba-Ket to be acting Lieutenant-Colonel while commanding a Combined Field Ambulance.

Majors W. S. McGillivray, G. Holroyd, W. E. Brierly, and Capt. G. L. Duncan to be acting Lieutenant-Colonels while commanding an Indian General Hospital.

Capt. J. P. Huban to be acting Lieutenant-Colonel while commanding an Indian Field Ambulance.

Capt. P. B. Bharucha and Temp. Capts. B. B. Shah, W. M. Will, and E. C. Brooks to be acting Majors while Registrars of an Indian General Hospital.

The King has approved the retirement of the following officers: Col. P. C. H. Strickland, and Lieut.-Col. J. Mulvany.

The King has approved of the resignation of Capt. P. S. Connellan.

Temporary Captains relinquishing their commissions: Narayan Lakshman Sheory and Vinayak Mahadeo Phatak (granted the rank of Captain).

# Correspondence.

"Audi alteram partem."

## NYSTAGMUS AND ILLUMINATION.

*To the Editor of* THE LANCET.

SIR,—Your annotation on this subject is timely and interesting, as at the present moment the construction of a better miner's lamp is under consideration by a special committee in London. Dr. T. L. Llewellyn is an indefatigable worker, and the point of interest to me in his Brussels paper—a copy of which he kindly sent me—is the much greater effect on illumination that is brought about by whitewashing the walls than by increasing the candle-power of the lamps. He informs me that the effect of stonedusting is not as good as whitewash, but very striking, and that 200 yards of roadway can be stonedusted in less than five minutes by the compressed air method. I hope that he will be able to persuade colliery owners to go a step further than the roads and carry it to the coal face where it is most needed.

As long as ten years ago I advocated introducing colour in coal mines,[1] and expressed the view that the cause of nystagmus was the absence of colour in them, but up to the present I have not heard of anybody agreeing with this theory. The thing that impressed me more than anything else on my first visit to a coal mine was the blackness and gloom of it. It seems almost incredible that miners should be content to work in such surroundings, and that owners do not realise how very different the mines could be made, and what an effect it would have on the workers if the surroundings were more cheerful. Sir Josiah Court, and Dr. Llewellyn up to quite recently, seem to have thought that the way to increase illumination was simply to have lamps with a greater candle-power, and declined to admit that absence of colour had anything to do with nystagmus. And yet the latter recognises that only from 3–10 per cent. of light is reflected, all the rest being lost by absorption by the black coal. To throw a great light on a black surface is a truly wasteful method of illumination. Now that roadways have been whitewashed it will be interesting to hear how much nystagmus occurs among men working in them. As far as I know there is none.

In a paper on Colour and Light in Relation to Miners' Nystagmus which I read at the Oxford Ophthalmological Congress in 1912[2] and again at the recent discussion by the Illuminating Engineering Society,[3] emphasis was thrown on the importance of colour in mines, not only of the colour of the surface, but also of the colour of the light thrown on that surface. Lately things seem to be moving, and colour is being put into mines—but not enough yet—and also into miners' lamps by at least one manufacturer, who makes a lamp with a yellow globe. The light from this, although not perfect, is far preferable to the bluish light from a metallic filament lamp. On the whole, I fancy that Dr. Llewellyn and others may now be inclined to attach more importance to colour than formerly. Probably the vitiated air in mines is another factor that should not be ignored.—I am, Sir, yours faithfully,

Ebbw Vale, Sept. 12th, 1920. H. S. ELWORTHY, F.R.C.S.

## WHEN IS AN ADVERTISEMENT NOT AN ADVERTISEMENT?

*To the Editor of* THE LANCET.

SIR,—In the leading article entitled "Your Telephone Number" in your issue of August 21st you raise the above question, and the answer is not easy. One might suggest various other questions of advertisement. Is publishing one's name in "Who's Who" an advertisement? I have been told that it is one of the best. Is writing a book on some specialty and advertising it in

[1] Brit. Med. Jour., Nov. 19th, 1910.
[2] Ophthalmoscope, December, 1912.
[3] Illuminating Engineer, March, 1920.

the medical papers, year in and year out, an advertisement? The sale of the book cannot pay for it. And, lastly, what is the distinction between the Post Office Directory and the Telephone Directory? In the former, for the last 20 odd years, my name, in conjunction with most of my fellows, has appeared in the "commercial" section as "Ophthalmic Surgeon," with telephone number and address; also in the "trades" section, under the heading of "Surgeons: Ophthalmic." I have not looked at a Post Office Directory for many years, and being out of town I cannot at present refer to one; but at the time when my name first appeared there, most of the well-known ophthalmic names were on the list.

In old days, "ophthalmic surgeons" and "aurists" were, I think, the only two specialists advertised, but there may be other headings now. We had to pay 5*s*. for the insertion in the "trades" section, and for some time I refused, feeling that it was nothing but pure advertisement. But when I found that nearly all the leading ophthalmic men, from the President of the Ophthalmological Society downwards, had their names in, I felt it useless to protest, and followed suit. Now, the 5*s*. payment has been dropped, but my name still appears. As to the value of the advertisement, it appears to be nil; at least, I have no knowledge of ever having had a patient through the Post Office Directory.

As regards your other point: Why pay a guinea? Years ago, in the days of the old telephone company, I suggested to them that it would be a great convenience to have a medical section of the Telephone Directory. They thanked me for the suggestion, but were not prepared to face the expense. Well, if a progressive telephone company would not face the expense, how much less will a government department, which can only run the telphone at a loss?

To a great extent the Telephone Directory has become one's address-book, and to be left out may cause trouble and loss, as I have recently found to my cost, my name having been omitted in error from the last issue. The proposed addition would be a great convenience for purposes of cross-reference, but as a positive advertisement it would have no value.

I am, Sir, yours faithfully,

RAYNER D. BATTEN.

Wimpole-street, W. (Mayfair 4353), Sept. 6th, 1920.

## GUINEA-PIG OR CAVY.

*To the Editor of* THE LANCET.

SIR,—In your last issue (p. 546) Professor H. B. Day, in describing some inoculation experiments, says that fluid was injected into "guinea-pig (A)," and later "half was injected into pig (B)." What did he actually do? Was the second animal a real pig, a hog, or was it, as appears most likely, a second guinea-pig? One may bear with resignation, if without much cheerfulness, the cheery enthusiasm which translates the inoculation of experimental animals into "pumping bugs into bunnies," and the like, so long as it does it in decent privacy in the laboratory. But when you, Sir, connive at the registration of such loose talk in a medical journal, I think it is time to make some protest. A pig is one thing and a guinea-pig is another, and if bacteriologists are not sufficiently grateful to the latter animal to give it its proper name, I would suggest that "cavy" might be made more general. It was, I think, Linnæus who said, "Nomina si nescis perit et cognitio rerum."

I am, Sir, yours faithfully,

Branscombe, Sept. 12th, 1920. A. E. BOYCOTT.

VOLUNTARY HOSPITALS AND THE SPIRIT DUTY GRANT.—We understand that the Ministry of Health and the Scottish Board of Health are prepared to receive applications from voluntary hospitals for grants in respect of payment of duty involved by the use of duty paid spirit or drugs containing duty paid spirit for medical and surgical purposes. Forms of application have been sent to those hospitals to which a grant was paid last year. Any other hospital which desires to make application should communicate immediately with the Secretary to the Ministry of Health, Whitehall, London, S.W.1, or the Secretary to the Scottish Board of Health, Edinburgh, as the case may be.

# Medical News.

UNIVERSITY OF LONDON.—A course of four lectures on Aids to Study will be given at University College by Dr. Charles E. Pearman, Grote Professor of Mind and Logic in the University of London, member of the Faculty of Medicine, on Tuesdays, at 5 P.M., beginning on Oct. 12th. The course is designed for first year students only, and will embody some practical results of psychological work with regard to learning and memorising.

UNIVERSITY OF PARIS.—A psychological institute is about to be established under a council of directors consisting of the following five professors—MM. H. Delacroix, G. Dumas, P. Janet, H. Piéron, and E. Rabaud, associated with the deans of the Facultés des Lettres et des Sciences, MM. F. Brunot and F. Houssay. The institute will undertake the practical and theoretical teaching of all branches of psychology—physiological, experimental, pathological, comparative, and general. The institute of pedagogy, founded last year, will be attached to the institute of psychology, of which it will form a section. The diploma course will consist of two terms, and, moreover, research can be carried out in the laboratories of the institute, under the supervision of the professors, in preparation for university degrees. Applications for admission should be sent any time after Oct. 15th to the Bureau des Renseignements de l'Université de Paris, at the Sorbonne.

EPSOM COLLEGE PENSIONS AND SCHOLARSHIP.—The Council of Epsom College will shortly award several France pensionerships of £30 a year to aged medical men in reduced circumstances; also a Home scholarship of £30 a year to the necessitous orphan daughter of a medical man who was for not less than five years in independent practice in England or Wales. Particulars can be obtained from the secretary of the College, 49, Bedford-square, London, W.C.1.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC.—A two months' post-graduate course in neurology will be held, starting on Oct. 4th. The fee for the course will be £7 7*s*., but holders of the Fellowship of Medicine ticket will be admitted free. Further particulars will be announced in our Medical Diary in a future issue.

INDUSTRIAL WELFARE SOCIETY.—The first lecture conference for welfare supervisors is being held at Balliol College, Oxford, from to-day (Friday) until Sept. 20th. The men attending are engaged in welfare work in industries of every kind. On Saturday, at 4.30 P.M., Mr. B. Muscio lectures on Industrial Psychology, and on Sunday, at 11 A.M., Dr. E. Halford Ross deals with Health in Industry. The secretary of the conference is Mr. C. Cullen, who may be addressed at Balliol College.

ORTHOPÆDIC CENTRE AT NEWCASTLE.—The orthopædic extension of the Royal Victoria Infirmary, which has actually been in occupation for some time, was formally opened on Sept. 9th by the Duke of Northumberland. The institution is fitted with all modern appliances and apparatus, including X rays, various forms of baths, and curative workshops; these include shops for carpenters, basket-makers, hairdressers, watchmakers, engineers, blacksmiths, and bootmakers, as well as printing and stencilling departments. The new buildings occupy 15 acres and have cost £160,000, of which £12,000 has still to be raised; there is accommodation for 500 in-patients, and the out-patients number well over 1000.

LECTURES ON INFANT CARE.—The National Association for the Prevention of Infant Mortality and for the Welfare of Infancy announce a special course of lectures on Infant Care for health visitors, nurses, teachers, and infant welfare workers to be held in the lecture theatre, University College, Nottingham, from Sept. 20th to 24th inclusive. Two lectures will be given each day, and the lecturers will include Dr. J. Sim Wallace, Dr. H. C. Cameron, Dr. J. W. Ballantyne, Lady F. Barrett, M.D., Dr. G. Margaret Dobrashian, and Miss J. Halford. The association announce also a course of elementary lectures on Infant Care, for infant welfare workers, teachers, and mothers, to be held at Morley Hall, George-street, Hanover-square, London, W.1, on Mondays at 6-7 P.M., from Sept. 27th to Dec. 13th. Under the joint auspices of this association and of the National Society of Day Nurseries a course of advanced lectures on Infant Care, especially intended for creche nurses and probationers, will be held at Essex Hall, Essex-street, Strand, London, W.C.2, on Thursdays, at 7.30 P.M., from Sept. 30th to Dec. 16th. Tickets for all three courses of lectures at 10*s*., 7*s*. 6*d*., and 10*s*. respectively can be obtained from Miss J. Halford at 4, Tavistock-square, London, W.C.1.

MEDICAL WOMAN MAGISTRATE.—**Dr. Janet E. Lane-Claypon**, Dean of the Household and Social Science Department, King's College for Women, has been made a justice of the peace for the County of London.

LORD HAIG'S DISABLED OFFICERS' FUND.—**Lord Haig's** appeal to sportsmen has already met with considerable success. That cricketers have not been slow to respond is testified by the exciting match at the Oval, which commenced on Monday last, between the Champion County and the Rest of England, when half the proceeds were given to the Fund. The big match on the Chelsea ground is evidence that football is doing its share and other sections of sport are contributing their quota.

**Mr. Henry J. Taylor, honorary ophthalmic** surgeon to the Bolton Infirmary, was presented at Preston, on Sept. 14th, with the Royal Humane Society's certificate on vellum for an attempt to rescue a man who had thrown himself into the flooded Ribble. Mr. Taylor, who is 55 years of age, dived in fully clothed, but his retriever dog followed and clung to his coat, preventing him from reaching the man, who was drowned.

ST. BARTHOLOMEW'S HOSPITAL AND COLLEGE.—The old students' dinner will take place in the Guildhall, and not in the Great Hall of the Hospital, as previously notified. This alteration has been made owing to insufficient accommodation. Other arrangements remain the same as announced in our issue of Sept. 4th.

ST. BARTHOLOMEW'S HOSPITAL NURSES' HOME.—The plans of building for Queen Mary's Home for nurses in training at St. Bartholomew's Hospital have been approved and the first block is to be commenced at once. The cost of a room and all that goes with it is £350, and certain rooms have already been named according to the wish of the subscribers. Special features of the proposed home include a separate bedroom for each nurse, a lecture theatre, a library, recreation rooms, numerous bath and shampoo rooms. The present amount of the fund is £100,000 and an equivalent sum is still required. Contributions should be sent to Mr. W. McAdam Eccles, at St. Bartholomew's Hospital, London, E.C. 1.

THE LATE DR. RUTHERFOORD HARRIS.—On Sept. 2nd Dr. Frederick Rutherfoord Harris died at Eastbourne at the age of 64. Son of a judge in Madras and educated at Leatherhead Grammar School and abroad, he studied medicine at Edinburgh University, qualifying M.R.C.S. Eng. in 1889 and L.R.C.P. Lond. in the following year. For a while he practised medicine in Kimberley. He then became associated with Cecil Rhodes, who appointed him secretary of the British South Africa Company. South African and later home politics then became his chief interest, combined with sport of all kinds. He was Member for Kimberley in the Cape Parliament, and in 1903 was returned to the House of Commons as Member for Dulwich, sitting there for three years. Even when politics brought him constant trouble and disappointment he never returned to the practice of his profession, but led a retired life for some years before his death.

# Medical Diary.

## LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

LONDON (ROYAL FREE HOSPITAL) SCHOOL OF MEDICINE FOR WOMEN, Hunter-street, Brunswick-square, W.C.

Post-Graduate Course on Venereal Diseases for Medical Women.

A Course arranged by the London (Royal Free Hospital) School of Medicine for Women, the Royal Free Hospital, the Elizabeth Garrett Anderson Hospital and the London Lock Hospital, for the instruction of qualified medical women in the Treatment of Venereal Diseases. The Course will extend over two weeks.

MONDAY, Sept. 20th.—5 P.M., Mrs. Rorke, M.B.: Out-patient Cliniques for Women and Children (at the Royal Free Hospital, Gray's Inn-road).

TUESDAY.—9.30 A.M., Injections (at the London Lock Hospital, 283, Harrow-road, W.) 2 P.M., Mr. C. Gibbs: Lecture and Visit to Wards (at the London Lock Hospital, Harrow-road). 6.30 P.M., Dr. Ruth Balmer: Out-patient Cliniques for Women and Children (at the Elizabeth Garrett Anderson Hospital, 144, Euston-road, N.W.)

WEDNESDAY.—9 A.M., Dr. Morna Rawlins: Visit to Maternity Wards and Labour Department (at the London Lock Hospital, Harrow-road). 11 A.M., Dr. Mary Schofield: Pathological Demonstrations (at the Royal Free Hospital). 3.30 P.M., Mr. J. E. Lane: Lecture and Visit to Wards (at the London Lock Hospital, Harrow-road).

THURSDAY.—9.30 A.M., Mrs. Rorke, M.B.: Visit to Venereal Disease Hostels. 2 P.M., Mr. J. E. R. MacDonagh: Lecture and Visit to Wards (at the London Lock Hospital, Harrow-road). 5 P.M., Mrs. Rorke, M.B.: Injections (at the Royal Free Hospital).

FRIDAY.—10 A.M., Mrs. Rorke, M.B.: Treatment Ante-natal Cases (at the Royal Free Hospital). 5 P.M., Mr. J. J. Abraham: Injections and Out-patient Clinique for Women and Children (at the London Lock Hospital, 91, Dean-street, W.). 6.30 P.M., Dr. Ruth Balmer: Out-patient Cliniques for Women and Children (at the Elizabeth Garrett Anderson Hospital).

SATURDAY.—9.15 A.M., Injections (at the Elizabeth Garrett Anderson Hospital).

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Sept. 20th.—2 P.M., Mr. B. Harman: Eye Department. 2 P.M., Mr. MacDonald: Surgical Out-patients.

TUESDAY.—10 A.M., Dr. McDougal: Electrical Department. 2 P.M., Dr. T. Gray: Surgical Out-patients.

WEDNESDAY.—2 P.M., Dr. Owen: Medical Out-patients. 2 P.M., Mr. Addison: Operations.

THURSDAY.—2 P.M., Dr. G. Stewart: Medical Out-patients. 2 P.M., Mr. MacDonald: Surgical Out-patients.

FRIDAY.—2 P.M., Mr. Banks Davis: Diseases of the Throat, Nose, and Ear. 2 P.M., Dr. Pernet: Skin Department.

SATURDAY.—2 P.M., Dr. Owen: Medical Out-patients. 2 P.M., Mr. Sinclair: Surgical Out-patients.

Daily:—10 A.M., Ward Visits. 2 P.M., In-patient, Out-patient Clinics and Operations.

MALE LOCK HOSPITAL, Dean-street, W.

MONDAY, Sept. 13th, WEDNESDAY, AND FRIDAY.—5 P.M., Dr. C. Russ: Demonstration of the Treatment of Gonorrhœa by Electrolysis.

MANCHESTER FRENCH HOSPITAL POST-GRADUATE LECTURES, 24, Acomb-street (behind Whitworth Park).

THURSDAY, Sept 23rd.—4.15 P.M., Dr. A. C. Magian: Tubal Abortion.

# Appointments.

BREWER, D., M.R.C.S., L.R.C.P. Lond., D.P.H., has been appointed Medical Officer of Health for the Borough of Swindon.

BROADFOOT, J., M.B., Ch.B. Glasg., Certifying Surgeon under the Factory and Workshop Acts for Dingwall.

MAYLARD, A. E., M.B., B.S. Lond., one of the Medical Referees under the Workmen's Compensation Act, 1906, for the Sheriffdom of Lanark.

TANNER, W. E., M.S., F.R.C.S., Assistant Surgeon to the Prince of Wales's General Hospital, Tottenham.

# Vacancies.

*For further information refer to the advertisement columns.*

*Aberdeen Royal Infirmary.*—Jun. M.O. £500.
*Abergavenny, Monmouthshire Asylum.*—Jun. Asst. M.O. £300.
*Ayrshire Sanatorium, Glenafton, New Cumnock.*—Res. Asst. £250.
*Barnsley, Beckett Hospital and Dispensary.*—Sen. H.S. £250.
*Barrow-in-Furness, North Lonsdale Hospital.*—Sec. Res. H.S. £225.
*Battersea General Hospital (Incorporated), Battersea Park, S.W.*—Third Res. M.O. £200.
*Bedford County Hospital.*—Asst. H.S. £150.
*Bethnal Green Infirmary, Cambridge-road, Bethnal Green, E.*—Two Jun. M.O's. £400.
*Birmingham General Hospital.*—Surg. Registrar. £200.
*Brighton, Royal Sussex County Hospital.*—Jun. H.S. £150.
*British Guiana.*—Asst. M.O.H. £600.
*Carnegie Dunfermline Trust.*—Asst. M.O. £500.
*Central London Ophthalmic Hospital, Judd-street St. Pancras.*—H.S. £100.
*Chesterfield and North Derbyshire Royal Hospital.*—Jun. H.S. £250.
*City of London Hospital for Diseases of the Chest, Victoria Park, E.*—H.P. £100. Also Tuberc. O. £600.
*Colchester, Essex County Hospital.*—H.S. £200.
*Colonial Service.*—M.O.'s for West African Medical Staff, Government Service in Malaya, East African Protectorates, West Indies (including British Guiana), Fiji, and the Western Pacific, &c.
*Coventry and Warwickshire Hospital, Coventry.*—Hon. P.
*Derby Borough Mental Hospital.*—Asst. M.O. £350.
*Derby, Derbyshire Royal Infirmary.*—Asst. H.S. and Cas. O. £200.
*Devonport, Royal Albert Hospital.*—H.S. £200.
*Durham University College of Medicine, Newcastle-upon-Tyne.*—Lecturer on Med. Jurisprudence.
*East Africa.*—M.O. to C.M.S., Kavirondo.
*Eastbourne, Princess Alice Hospital.*—Res. M.O. £175.
*East London Hospital for Children and Dispensary for Women, Shadwell, E.*—H.S. and H.P. £125.
*Egyptian Government, School of Medicine.*—Prof. of Pharmacology. L.E. 1,200–1,440. Lecturer in Anat. L.E. 720.
*Glamorgan County Asylum, Bridgend.*—Jun. Asst. M.O. £350.
*Glasgow District Mental Hospital, Gartloch, Gartcosh.*—Asst. M.O. £350.
*Heywood Borough.*—M.O.H. £600.
*Hospital for Sick Children, Great Ormond-street, W.C.*—Cas. M.O. £200. Also Asst. Cas. M.O., H.S., and H.P. £50 each.
*Huddersfield Royal Infirmary.*—Asst. H.S. £150.
*Hull City Asylum, Willerby, near Hull.*—Jun. Asst. M.O. £300.
*Hull Royal Infirmary.*—Asst. H.S. £150.
*Ingham Infirmary and South Shields and Westoe Dispensary.*—Jun. H.S. £175.
*Johannesburg, South African School of Mines and Technology.*—Professorship of Vet. Anat. £860.
*Kensington Board of Guardians Infirmary, Marloes-road.*—Pathologist. £300.
*Lancaster County Asylum.*—Asst. M.O. £300.
*Leeds City.*—Asst. M.O. £500.
*Leicester Royal Infirmary.*—H.P. £200. Also Res. Anæsth. £250.
*Lincoln County Hospital.*—Jun. H.S. £150.
*Liverpool Royal Infirmary.*—H.P.'s, H.S.'s, & Sen. Cas. O. £60 each.
*Macclesfield General Infirmary.*—Res. H.S. £200.
*Maidstone, Kent County Mental Hospital.*—Jun. Asst. M.O. £300.
*Maidstone, Kent County Ophthalmic Hospital.*—H.S. £300.
*Maidstone, West Kent General Hospital.*—Two H.S.'s. £220.
*Manchester, Ancoats Hospital.*—Res. Surg. O. £250.

*Manchester Northern Hospital for Women and Children, Park-place, Cheetham Hill-road.*—H.S.
*Manchester, St. Mary's Hospitals for Women and Children.*—H.S. for Whitworth Park Hospital. £100.
*Manchester Royal Infirmary, Central Branch, Roby-street.*—Res. M.O. £250.
*Margate, Princess Mary's Hospital for Children, Cliftonville.*—Jun. Asst. M.O. £515 6s.
*Metropolitan Asylums Board Infectious Hospitals Service.*—Jun. Asst. M.O.'s. £515 6s.
*Middlesbrough Education Committee.*—Sch. Dent. £400.
*Ministry of Pensions, London Region.*—Med. Referee (Marylebone Borough).
*National Hospital for Diseases of the Heart, Westmoreland-street, W.*—Out-patient M.O. £150.
*National Hospital for the Paralysed and Epileptic, Queen-square, Bloomsbury, W.C.*—Registrar. £200. Also Sen. H.P. £150.
*Newcastle-upon-Tyne City Mental Hospital, Gosforth.*—Sen. Asst. M.O. £500.
*Northampton General Hospital.*—H.S. £200.
*Nottingham City Education Committee.*—Jun. Asst. Sch. M.O. £500.
*Pontypridd Urban District Council.*—Female Asst. M.O. £550.
*Prince of Wales's General Hospital, Tottenham, N.*—H.P. and H.S. £200. Jun. H.S. and Jun. H.P. £120.
*Queen's Hospital for Children, Hackney-road, Bethnal Green, E.*—H.S. £100.
*Reading, Royal Berkshire Hospital.*—H.P. and Second H.S. £200 each.
*Royal London Ophthalmic Hospital, City-road, E.C.*—Asst. M.O., Department for Venereal Diseases. £1 1s. a session.
*St. Mary's Hospital, Paddington, W.*—Res. Asst. Anæsth. £100.
*Salford Royal Hospital.*—Res. Surg. O. £250. H.P. £200. H.S., Jun. H.S., and Cas. H.S. £150 each.
*Scarborough Hospital and Dispensary.*—Two H.S.'s. £150.
*Sheffield Royal Hospital.*—Asst. Cas. O. £150.
*Sheffield Royal Infirmary.*—H.S. for Ear, Nose and Throat. £150.
*Sheffield University, Department of Pathology and Bacteriology.*—Director. £800. Asst. Director. £500. Curator of Path. Museum. £500.
*Southampton County Borough.*—Asst. M.O.H. £500.
*Sydney University, New South Wales, Australia.*—Chair of Dentistry. £1100. Also Chair of Physiology. £1150.
*Taunton and Somerset Hospital.*—Jun. H.S. £150.
*Uganda.*—M.O. to C.M.S. Mengo Medical School.
*Wakefield, Clayton Hospital.*—Sen. H.S. £250. Also Jun. H.S. £200.
*West Hartlepool, Cameron Hospital.*—H.S. £300.
*Westmorland Sanatorium and Home, Meathop, Grange-over-Sands.*—Res. Asst. M.O. to the Westmorland Sanatorium and Asst. Tubere. O. for Westmorland. £350.
*Winchester, Royal Hampshire County Hospital.*—H.S.
*Wolverhampton and Staffordshire General Hospital.*—H.S. £200.
*Woodilee Mental Hospital, Lenzie, near Glasgow.*—Asst. M.O. £350.
*Worcester County and City Mental Hospital, Powick.*—Jun. Asst. M.O. £350.
*Worcestershire County Council.*—Sch. Oculist. £5£0.

**The Chief Inspector of Factories, Home Office, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Heckington, Chryston, and Staines.**

# Births, Marriages, and Deaths.

## BIRTHS.

ALDRIDGE.—On Sept. 9th, at Magdalene House, Glastonbury, Somerset, the wife of Dr. F. J. Aldridge, of a son.
BUNBURY.—On Sept. 7th, at Highfield, Colsterworth, the wife of E. G. Bunbury, M.R.C.S., L.R.C.P., of a son.
GOODE.—On Sept. 10th, at Bootham, York, the wife of Henry Norman Goode, M.C., M.B., F.R.C.S.E., of a son.
KIRK.—On Sept. 4th, at Treeton House, Bellingham, Northumberland, the wife of Dr. G. W. L. Kirk, of a daughter.
MALONE.—On August 21st, in a Nursing Home, Belfast, the wife of Surgeon Lieut.-Comdr. A. E. Malone, M.B., B.A., Royal Navy, of a daughter.

## MARRIAGES.

CONOLEY—COWAN.—On Sept. 9th, at Marlborough House, Glasgow, Oliver Francis Conoley, M.R.C.S., L.R.C.P.; London, to Isobel Margaret, daughter of Jas. N. Cowan, Mount Florida, Glasgow.
HILL—FORTUNE.—On Sept. 7th, at St. John's, Dumfries, Dr. James Gill Hill, M.C., to Julia Violet McNaghten, youngest daughter of Mr. and Mrs. J. Fortune, of Bengairn, Kirkcudbrightshire.
JEPSON—SCOTT.—On Sept. 7th, at St. Mark's, Surbiton, Captain W. Baly Jepson, M.C. (late R.A.M.C.), to Jean Margarita, only surviving child of Mr. and Mrs. R. A. Scott, of Cathay, Surbiton,
MCFADYEAN—MCCORMICK.—On Saturday, Sept. 11th, at Holy Trinity Church, Haverstock-hill, N.W., Kenneth McFadyean, M.R.C.S., L.R.C.P., to Elsie, youngest daughter of Mr. and Mrs. W. A. McCormick, Windermere-avenue, Finchley, N.
WATSON—CHARRINGTON.—On Sept. 8th, at St. Bartholomew's, Leigh, Surrey, Lieutenant-Colonel John W. Watson, C.I.E., I.M.S., to Ruth Mary, daughter of the late Ernest Charrington, and Mrs. Wilfred Hadley, Parkside, Reigate.

## DEATHS.

BABTIE.—On Sept. 11th, very suddenly, at Knocke-sur-Mer, Belgium, Lieutenant-General Sir William Babtie, V.C., K.C.B., K.C.M.G.
GUINNESS.—At Nairobi, British East Africa, Wyndham Malan Grattan Guinness, M.D.
JOHNSON.—On Sept. 12th, in London, Obadiah Johnson, M.D., of Marble Hall, Lagos, Nigeria, aged 71 years.
TEEVAN.—On August 20th, at Upper Grosvenor-road, Tunbridge Wells, Henry Teevan, M.R.C.S. Eng., L.S.A., formerly Captain, 75th (Stirlingshire) Regiment.

*N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.*

# Notes, Short Comments, and Answers to Correspondents.

## THE UNIVERSITY PROBLEM.[1]

### BY SIR EDWARD SHARPEY SCHAFER, F.R.S.

To keep up with the times a university must constantly expand. The mediæval university merely needed intellectual expansion. But the time is past when a university could be physically constituted out of a library and lecture rooms. It is chiefly the extensions imposed upon the universities by the teaching of the natural sciences which necessitate their physical expansion, and we have to consider how such expansion is to be effected. The particular difficulty in providing for the requirements of the natural sciences is the furnishing of adequate laboratory accommodation.

The members who constitute the governing bodies of most universities appear unfortunately unable to appreciate the fact that the university will have a far longer life than its individual members. University buildings are usually so constructed as to be incapable of extension. And in consequence of this lack of foresight a laboratory which has seemed, and perhaps has been, adequate for its purpose at the time of its construction will in the course of 20 years become inadequate. Plans for new buildings are generally drawn up in such a manner that future expansion is barred. So that the problem of adequate *provision* presents itself again in a few years, when with proper *prevision* it might have been settled for many years.

### *The Ideal Environment.*

The idea is unfortunately prevalent in this country that universities should be situated in large cities, but the ideal environment of a university is an Academia—a place for undisturbed work and quiet contemplation, whence the sights and sounds of the city are excluded—not a site in the middle of the town with traffic rumbling past, surrounded as often as not by slums and squalor, by dirty streets with cheap lodging-houses, with music halls and movies in convenient proximity; but with hardly a yard of ground in possession beyond that to be covered by the buildings, and with the possibility of expansion only at enormous cost. If the situation chosen is in a prominent situation the building must have a handsome elevation, increasing the cost hugely whilst generally diminishing its value for the purpose for which it is erected. Is it any wonder, when such large sums have to be paid for site and building, that but little is left for equipment and brains?

Take, for example, the University of London—now University College. About a century ago it occurred to a few people that a university education should be available to any member of the community, whatever his opinion on religion, who might be able to take advantage of the educational privileges offered. A large sum of money was collected, and the site selected was little more than a mile from Charing Cross. Though with the money at their disposal the promoters of the new university might have bought a couple of hundred acres, and still have had money enough for all the building required, they bought a comparatively small plot of land and spent the greater part of their money in erecting an incomplete edifice, provided with a fine dome and portico, but lacking the endowments which are needed to attract and keep the best scholars. Their unwise example has been followed everywhere. No founders of universities in this country realise that every university will need unlimited room for expansion, and that this can only be obtained by the acquisition of land on a large scale at the time the university is founded. The difficulty of getting it later may be insuperable, as, indeed, the attempts to extend the University of London have abundantly shown. One of the present schemes for its expansion contemplates the acquisition of a large area in the neighbourhood of the British Museum, covered with streets and houses. Its carrying out would involve the expenditure of many millions of money, and would only then provide for immediate necessities; in 50 or 100 years far more space will be wanted. The sum needed to promote such an undertaking would be sufficient to provide at least four university centres for London, provided they are set down where an adequate amount of land can still be purchased at a reasonable expense. Why London, with its permanent population of 7 millions and its large floating population, should not have as many universities or university centres as Scotland or Sweden, or more than Ireland or Norway, or Yorkshire—all with smaller populations—is a question which can be rightly answered only in

[1] Abridged from an address delivered at Cardiff to the Medical School of the University College of South Wales.

one way, although up to the present the reply has not taken the direction that common sense would indicate. The longer London waits the further must its universities go afield and the greater will be the cost of establishing them

*The Acquisition of Land.*

The extreme difficulty of providing sufficient land for expansion within the limits of a city was shown in the experience of Edinburgh University, where a site was secured in the neighbourhood of the existing university building which was found inadequate almost at once on completion of the building. The need for further accommodation has of late assumed an acute form, and further provision for the medical sciences is again urgently demanded. Steps have been taken to obtain a site on which to erect a Lister Institute. For this site, of about two and a half acres, covered by tenement houses, which must be removed before it can be utilised, the large sum of £55,000—about £22,000 an acre—has to be paid; it is estimated that the buildings to be accommodated upon it will cost nearly a quarter of a million of money, and to judge from past experience, the necessity for further expansion will arise before the institute has been long occupied. This will only provide for a single subject. There are many others which are crying out just as loudly for expansion, and to meet their demands a site comprising many acres will soon have to be found.

Fortunately for the future of Edinburgh, the present head of the university has been able to look into the future further than his predecessors, and has persuaded the governing body to purchase a plot of land of about 115 acres on the outskirts of the city, little more than a mile from the existing university, and easily accessible even by present means of conveyance. The site is admirably adapted for a university park or campus with abundance of space for buildings. It will furnish room for an amount of expansion which is not likely to be overtaken within at least the next hundred years. The cost of acquiring this large area of land is little more than half that needed to obtain the two and a half acres wanted for the Lister Pathological Institute. And the transference to it of all laboratories which are not immediately related to clinical work can, in view of the site difficulties within the city itself, only be a question of time. Nor is there any reason why a university hospital should not be one of the laboratories to be erected upon it. For a hospital is, in fact, a laboratory, in which the experiments which nature or accident make upon the human subject are utilised for the treatment and study of disease. Doubtless a large sum of money would be required to carry out the scheme in its entirety. But it will not cost half as much as an attempt to continue the present system, and when the benefits which will accrue are realised there should be little doubt as to which policy will ultimately prevail.

The longer the delay in acquiring land near a growing town the less can be acquired and the more must be paid. Compare the relative values just given. Two and a half acres of town land for £55,000, and 115 acres a short distance away for £28,000. In fifty to a hundred years' time this 115-acre plot would also, under ordinary circumstances, have become town land and have been covered with houses; and even at the present rate for town land the cost would then be more than 2½ million pounds!

I have mentioned this matter because, although the acquisition of a large area of land for university buildings is not only a common but even a constant feature in the United States, this is, so far as I know, the first time the principle has been adopted in our own country.

Every university should have enough land for all purposes. Even 100 acres may not suffice for the university buildings alone. Cornell, founded little more than 50 years ago, already finds a campus of this size inadequate. Besides lecture-rooms and laboratories provision should be made for students' hostels, for athletic grounds, for professors' and lecturers' houses. A university so planned would be self-contained—a small city in itself—within which not only means for instruction, but also for recreation and amusement are provided.

That the university ought to possess more land than even its own probable future necessitates is indicated by the fact that the planting of such an institution in a spacious park tends to stimulate the erection of good houses in its neighbourhood and raises the value of the land around it. Why should not the university have the benefit of this rise in value instead of the speculative builder?

The above considerations render it obvious that a university should acquire, while it can be acquired, enough land not only for present but for all future needs.

The question of site is intimately bound up with the style, arrangement, and cost of the buildings to be erected on it. If the university is free to build laboratories on its own land a simpler and less expensive style of architecture can be adopted, and, moreover, it is unnecessary to provide high buildings; each department can be self-contained, easily capable of extension, and abundantly lighted.

*The Advantages of Temporary Buildings.*

Not the least advantage of the possession of a campus is the freedom it gives the university to put up temporary buildings, a very real advantage when there is difficulty in obtaining large sums of money. But the advantage of a temporary building is not alone that of economy. Probably no building was ever yet constructed, however carefully, in which it was not found that mistakes had been made which could only be set right with difficulty and expense. In many cases the work and teaching of a new professor has been seriously hampered by having to be carried on in a laboratory designed by his predecessor. There is much to be said, therefore, for the erection, in the first instance, of buildings of a temporary character—so constructed, however, that they may be used with advantage for 50 years or more. There is no laboratory in the world, however expensive and magnificent its construction, which will not be antiquated in the course of 50 or 60 years. Thus, seeing that it can be easily replaced at a relatively small cost, a temporary building may serve its purpose even better than a professedly permanent structure.

*The Problems of Expansion.*

The crux of schemes for extension is the problem as to whether a university should welcome all who desire to receive instruction within its walls, or should impose a limit upon the number it is willing to admit. It will surely be a calamity if our universities are compelled to refuse admission to genuine students. But it will be a greater calamity to admit them and provide inadequately for their instruction.

Again, by no means the least part of the subject of university expansion concerns facilities for research. Universities were no doubt originally established for teaching, but it is universally recognised that if a high standard of teaching is to be maintained this must go hand in hand with the pursuit of new knowledge. With the growth of science and medicine the necessity is more than ever imperative, and the encouragement of original investigation is to be looked upon as a university function not less important than the imparting of information.

Lastly arises the all-important question of finance. How is the money for university expansion to be provided? For it must be admitted that no university can be self-supporting. There should be no hesitation about the answer: A university education ought to be provided by the State for all who are capable of benefiting by it. Elementary and secondary teaching are already so provided; why make an exception for the highest grade? The benefit of elementary and secondary education is mainly individual: the indirect benefit to the community which is often assumed to result from it is problematical. But education of a university character is an asset of direct value to the community. No elaborate argument is required to prove this. All important progress in science, whether in manufactures, in means of communication, in naval and military matters, in engineering, in medicine, has been the result of purely scientific researches carried on for the most part in universities or in colleges of a university standard. It is therefore not only the *duty* but the *interest* of the State to maintain universities in full efficiency. But no statesman in our country has ever recognised this duty or attended to this interest.

If there could be found a statesman to treat the question of providing for the needs of the universities, not in a niggardly manner or as if it were a question of charity, but as a sound business proposition of direct benefit to the State, how much better a chance should we have not only of maintaining our own material position, but, which is yet more important, of contributing our proper share to the sum of human knowledge and thereby ministering to the happiness and prosperity of mankind!

## COLONIAL HEALTH REPORTS.

*Leprosy in Rodrigues.*

RODRIGUES or Rodriguez is a coral island of 42 square miles extent and with less than 2000 inhabitants, situated in the Indian Ocean some 350 miles east of Mauritius. In a report, submitted by Dr. S. E. Mangenie to the Medical and Health Department of Mauritius, he says there is no doubt that leprosy was introduced into the island by a man known as "Diango," who came from Mauritius about 40 or 50 years ago. Diango, who was employed as a fisherman by a family residing at Oyster Bay, a small coast settlement, developed leprosy four or five years later and went to reside up the mountain. A year or so after his departure one of the sons of his employer, who used to fish with him in the same boat, became affected with the disease and from this one and only source of contagion the disease gradually made its appearance in other families, all residents of Oyster Bay. Dr. Mangenie is aware of 23 cases of leprosy, 16 of which are the descendants, directly or through marriage, of the first family affected with the disease. The other 7 cases are scattered over the island and these sufferers

are the descendants of Diango. During the last seven years four or five deaths due to leprosy have been registered and about nine new cases have come to light. Dr. Mangenie suggests that a scheme for proper and strict isolation should be put in force.

*Straits Settlements.*—The estimated population of the colony in 1918 was 827,719. The birth-rate decreased from 30·7 in 1917 to 28·6 per 1000 in 1918. The death-rate, on the other hand, increased from 37·0 per 1000 in 1917 to 43·9 in 1918. The principal causes of death in the latter year were malaria (4783 cases), infantile mortality (6009), influenza (3500), tuberculosis (2536), beri-beri (1961), and dysentery (1362). Dangerous infectious diseases notified in the colony during the year caused 55 deaths from small-pox, 68 from cholera, and 204 from plague, the corresponding figures in 1917 having been 176, 9, and 44. An outbreak of beri-beri in the prisons was traced to prisoners having been fed on rice steamed under pressure. After the cause had been ascertained and rectified there were practically no fresh cases.

*Leeward Islands.*—In his report on the Blue-book Mr. F. H. Watkins, acting Colonial Secretary, states that in Antigua the estimated population on Dec. 31st, 1918, was 31,179. The births registered in 1918 numbered 1169, being 37·5 per 1000. The legitimate births were 295 and the illegitimate 874. The death-rate was 31·6 per 1000. The deaths of children under 1 year, exclusive of stillbirths, were 20·3 per cent. of the total. In the Presidency of St. Kitts-Nevis the estimated population at the close of 1918 was 27,047 in St. Kitts, 12,254 in Nevis, and 4878 in Anguilla. The birth-rates were in St. Kitts 34·6 per 1000, in Nevis 38·1, and in Anguilla 33·2, whilst the death-rates were—St. Kitts, 28·7 per 1000, Nevis 25·0, and Anguilla 17·7. The mortality of infants under 1 year of age was 300, 284, and 133 per 1000 of the total death-rate in St. Kitts, Nevis, and Anguilla respectively. In Dominica the estimated population was 40,270; the birth-rate was 36·7 per 1000 and the death-rate 28·0. The illegitimate births were in excess of the legitimate. Montserrat had a population in 1918 of 11,264; the birth-rate was 35·9 and the death-rate 19·1 per 1000. The general health of the colony was satisfactory, but, the report adds, "No great advance will be made in health and sanitary conditions until the people as a whole are brought to realise the importance of cleanliness in elementary habits, and of ventilation and a well-regulated diet, especially for infants."

## BRISTOL HOSPITAL SUNDAY FUND.

THE Lord Mayor of Bristol has collected this year a total of £6028 6s. 9d., and has thus exceeded all previous collections by more than £900. Approximately half the money came from places of worship, and the remainder from schools, athletic clubs, and various sources. The fund is gradually assuming a place of importance among the various sources of hospital income, though at present it covers only a small fraction of the hospital expenditure of the city.

## RHEUMATISM AND STAMMERING.

IN a recent report submitted to the Education Committee of the London County Council on the classes for the remedial treatment of stammering children, established in January, 1920, it was noted that boy stammerers outnumber girl stammerers in at least the proportion of 3 to 1. In a class held at Brixton the medical officer pointed out that of 7 children in whom the stammering developed after the age of six, 6 were cured. Two of these cases were ascribed to fright, 2 were imitative cases, and 2 came on after rheumatic fever. The common association of rheumatic fever with another disease of coördination in childhood—namely, chorea—is of course well established.

## FUNCTIONAL RE-EDUCATION IN AMERICA.

DURING December, 1917, and the first half of 1918, Dr. W. Seaman Bainbridge visited Europe on behalf of the U.S. Navy Department, and subsequently his Report on Medical and Surgical Developments of the War was issued as a special number of the *United States Naval Medical Bulletin* (Washington, Government Printing Office). Dr. Bainbridge used his eyes well, and, in addition to his own vivid descriptions of his visits in England and on the continent, has included in his report brief summaries of the surgical lessons of the war from such authorities as Mr. H. S. Souttar and Professor (then Colonel) Gosset. The section on vocational training, abundantly illustrated with pictures taken in France, Belgium, and England, is perhaps of the greatest interest at the present time. Dr. Bainbridge emphasises the need of propaganda work to bring home to the general public their responsibility in caring for the permanent welfare of war cripples. He mentions that four cinema reels have been prepared to this end by the American Red Cross. To M. Edouard Herriot, the Mayor of Lyons, is given the credit for placing France at the head of European countries in first recognising officially the work of vocational re-education. The centre at the Grand Palais in Paris is noted as a model for American centres. The fine Department of Physiotherapy which has grown up since this report was written, under the care of Commander Bainbridge himself at the Brooklyn Naval Hospital, no doubt owes much to the inspiration of the earlier French work. The author believes that functional re-education should not wait for wounds to heal nor vocational training until function is completely restored. He urges that if schools must be under military discipline the latter should as far as possible be camouflaged, adding, "for the men are sick of military routine and resent control." The centres should be made home-like and attractive.

## A HYGIENIC TRUSS PAD COVER.

THE R. H. Heward Company, of Twickenham, has sent us a sample of a moulded rubber truss pad cover, which is certainly conducive to cleanliness and comfort. It fits snugly over the pad and is fastened by a stud button.

## HINTS TO MEDICAL WRITERS.

THE New York State *Journal of Medicine* suggests rules to writers which, if carried out, would materially lighten the task and, incidentally, brighten the life of the medical editor. When the subject is selected (so the admonition runs) write or dictate everything that may be in the mind or that may occur as pertinent to it. Then do three things: First, select a definite title or a clear definite text. Write it in clear large words; set it up before you on your desk; take your paper, a good blue pencil, and mercilessly cut out everything that does not conform with the text. Ability to "follow the text" is one of the highest attributes of the human mind. Second, go over the various paragraphs that remain and arrange them in logical order. Third, go over what is then left and study each important word and select synonyms that will best express the thought in your mind.

The admonition is reminiscent of the advice received in our youth, to think before saying anything whether it was true, kind, and useful. The application of either rule would considerably reduce output.

## Communications, Letters, &c., to the Editor have been received from—

A.—Argus South African Newspapers, Lond.; Australia, High Commissioner for, Lond.
B.—Dr. W. C. Bosanquet, Lond.; Sir J. Byers, Belfast; Prof. A. E. Boycott, Branscombe; Sir J. R. Bradford, Lond.; Dr. G. Blacker, Lond.; Dr. C. Banks, Guernsey.
C.—Mr. W. T. Cranfield, Lond.; Dr. J. Cowan, Glasgow; Mr. H. Curtis, Lond.; Chicago School of Sanitary Instruction; Dr. J. T. Clarke, Kedah; Colonial Office, Lond.; Messrs. G. W. Carnrick Co., New York; Sir F. Colyer, Lond.; Mr. P. P. Cole, Lond.; Mrs. A. E. Cockerill Ilfracombe; Colonies, Under-Secretary of State for the.
D.—Dr. V. Dickinson, Lond.; Dr. J. W. Dalgleish, Sutton.
E.—Mr. D. L. Eadie, Edinburgh; Dr. A. Erdös, Oradea Mare; Mr. H. S. Elsworthy, Ebbw Vale; Epsom College, Lond., Sec. of.
F.—Dr. J. G. Forbes, Lond.; Dr. C. Flandin, Paris; Factories, Chief Inspector of, Lond.; Food Education Society, Lond., Hon. Sec. of.
G.—Genatosan, Lond.; Dr. S. R. Gloyne, Lond.; Dr. L. H. Guest, Lond.; Great Northern Central Hospital, Lond.
H.—Dr. C. T. W. Hirsch, Lond.; Mr. W. Howell, Lond.; Hôpital Français de Manchester, Hon. Sec. of; Mr. A. Hay, Aberdeen; Mr. R. R. Hyde, Lond.
I.—Imperial War Relief Fund, Lond.
J.—Johnson Society, Lichfield.
K.—Dr. W. N. W. Kennedy, Croydon.
L.—Dr. C. Lillingston, Gorleston; Dr. J. C. G. Ledingham, Lond.; Messrs. Lloyd and Bradham, Lond.; Miss G. M. E. Leigh, Edgbaston.
M.—Dr. K. M. McKeown, Belfast; Dr. E. D. Macnamara, Lond.; *Modern Medicine*, Chicago; Mr. J. S. Milne, Newcastle-on-Tyne; Dr. J. E. R. McDonagh, Lond.; Ministry of Health, Lond.; Mr. R. F. Moore, Lond.; Dr. A. McDonald, Washington.
N.—National League for Health, Maternity, and Child Welfare, Lond.; National Institute for Medical Research, Lond.; New York State Dept. of Health, Albany; National Hospital for the Paralysed and Epileptic, Lond.
P.—Dr. A. L. Punch, Lond.; Dr. J. Parkinson, Lond.
R.—Dr. J. D. Rolleston, Lond.; Dr. A. Rutherford, Edinburgh; Royal Mail Steam Packet Co., Lond.; Royal Faculty of Physicians and Surgeons, Glasgow.
S.—Dr. W. R. Smith, Adelaide; St. Bartholomew's Old Students' Dinner, Lond., Hon. Sec. of; Scientific and Industrial Research Dept., Lond.; Prof. W. Stirling, Manchester; Society for the Prevention and Cure of Consumption in the County of Durham, Sunderland; Dr. N. Samaja, Bologna; Dr. A. W. Stott, Lond.; Mr. F. B. Shawe, Swindon.
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U.—University College, Lond., Provost of.
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